

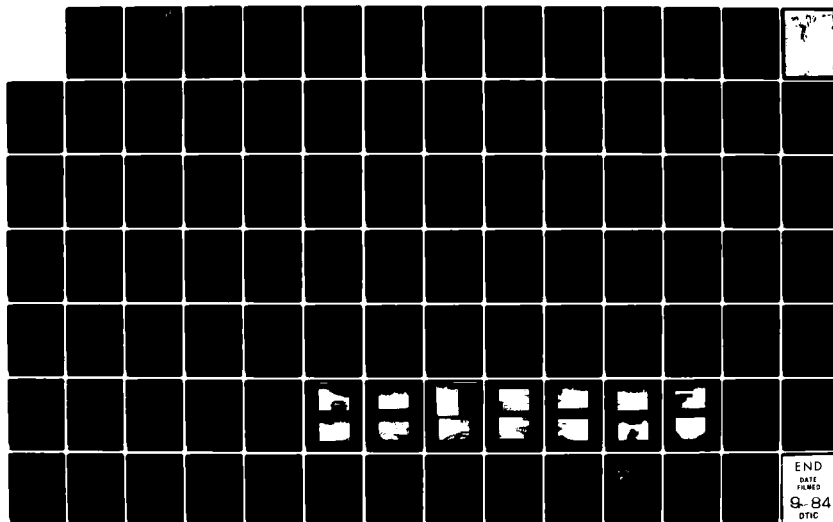
AD-A145 069

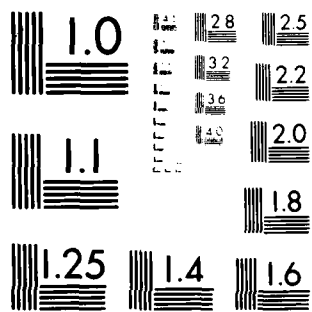
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS  
STEVENS PAPER COMPANY... (U) CORPS OF ENGINEERS WALTHAM  
MA NEW ENGLAND DIV MAR 79

1/1

UNCLASSIFIED

F/G 13/13 NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

AD-A145 069

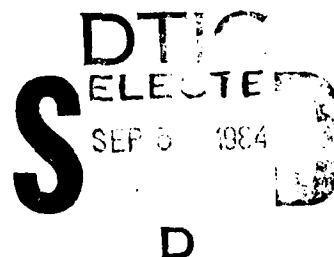
CONNECTICUT RIVER BASIN  
WESTFIELD, MASSACHUSETTS



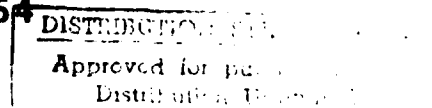
STEVENS PAPER COMPANY  
(LOWER DAM)  
MA 00074

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

DTIC FILE COPY



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS. 02154



MARCH 1979  
84 09 05 114

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MA 00074	2. GOVT ACCESSION NO. A145069	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Stevens Paper Company (Lower Dam)  NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE March 1979
		13. NUMBER OF PAGES 60
		15. SECURITY CLASS. (of this report)  UNCLASSIFIED
		18a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Westfield, Massachusetts		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This dam generally consists of a 190 foot masonry spillway, an earthfill embankment and 2 outlet pipes. The visual inspection showed the dam to be in good condition. The dam has a size classification of intermediate and a hazard classification of low. The test flood is the 1/2 PMF.		



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

REPLY TO  
ATTENTION OF

NEDED

MAY 14 1979

Honorable Edward J. King  
Governor of the Commonwealth of  
Massachusetts  
State House  
Boston, Massachusetts 02133

Dear Governor King:


I am forwarding to you a copy of the Stevens Paper Company (Lower Dam) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Stevens Paper Mills, Inc., 77 Mill Street, Westfield, Massachusetts 01085.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

  
JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer

Incl  
As stated

NATIONAL DAM INSPECTION PROGRAM

PHASE I INVESTIGATION REPORT

BRIEF ASSESSMENT

Identification No.: MA 00539  
Name of Dam: Stevens Paper Company - Lower  
City: Westfield  
County and State: Hampden County, Massachusetts  
Stream: Little River  
Date of Inspection: December 5, 1978

This dam generally consists of a 190 foot masonry spillway, an earthfill embankment and 2 outlet pipes. The dam was designed in 1955 by Stone and Webster Engineering Corporation to replace an earlier dam, which was damaged by the flood of that year. Construction which utilized portions of the original structure was completed in 1957. The major purpose of the dam is for water supply. The dam is owned, operated, and maintained by the Stevens Paper Mills, Inc. of Westfield, Massachusetts.

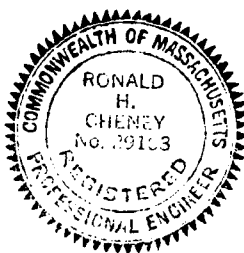
The visual inspection showed the dam to be in good condition. However, water passing over the spillway limited the inspection of the spillway.

The dam has a size classification of intermediate and a hazard classification of low. According to Corps guidelines, the test flood is the one half Probable Maximum Flood. The test flood outflow is 40,372 cfs. The spillway is capable of passing 96% of this outflow. The top of the embankment, elevation 175, would be overtopped by about 1 foot. However, failure

*Stevens Paper Company*



under this condition would only cause insignificant damage as the downstream flooding would have already occurred. Since indepth engineering data was not available, the adequacy of the dam was assessed primarily on visual inspection, past performance history and hydrologic and hydraulic assumptions.

The dam is generally in good condition. However, it is recommended that the owner repair the drawdown outlet, and operate it at least once yearly to insure continued adequacy. After this outlet is repaired, or during a period of low flow, the owner should engage a qualified engineer to inspect the spillway without water flowing over it. Also the erosion of a retaining wall downstream of the spillway on the right abutment side should be repaired. These actions should be implemented within two years after receipt of this Phase I Report by the owner.



*Ronald H. Cheney*  
Ronald H. Cheney, P.E.  
Associate

Hayden, Harding & Buchanan, Inc.  
Boston, Massachusetts

Accession For	
RECEIVED 	
RECEIVED	
Unrecorded	
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
	

Stevens Paper Company

This Phase I Inspection Report of Stevens Paper Company has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

*Joseph W. Finegan*  
JOSEPH W. FINEGAN, JR., MEMBER  
Water Control Branch  
Engineering Division

*Joseph A. McElroy*

JOSEPH A. MCELROY, MEMBER  
Foundation & Materials Branch  
Engineering Division

*Carney M. Terzian*

CARNEY M. TERZIAN, CHAIRMAN  
Chief, Structural Section  
Design Branch  
Engineering Division

APPROVAL RECOMMENDED:

*Joe B. Fryar*  
JOE B. FRYAR  
Chief, Engineering Division

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Inspections. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

## CONTENTS

<u>Section</u>	<u>Page</u>
Letter of Transmittal	
Brief Assessment	
Review Board Page	
Preface	i
Table of Contents	iii-v
Overview Photo	vi
Location Map	vii

## REPORT

### 1. PROJECT INFORMATION

1.1 General	1
a. Authority	1
b. Purpose of Inspection	2
1.2 Description of Project	2
a. Location	2
b. Description of Dam and Appurtenances	2
c. Size Classification	3
d. Hazard Classification	3
e. Ownership	4
f. Operator	4
g. Purpose of Dam	4
h. Design and Construction History	4
i. Normal Operating Procedures	5
1.3 Pertinent Data	5

### 2. ENGINEERING DATA

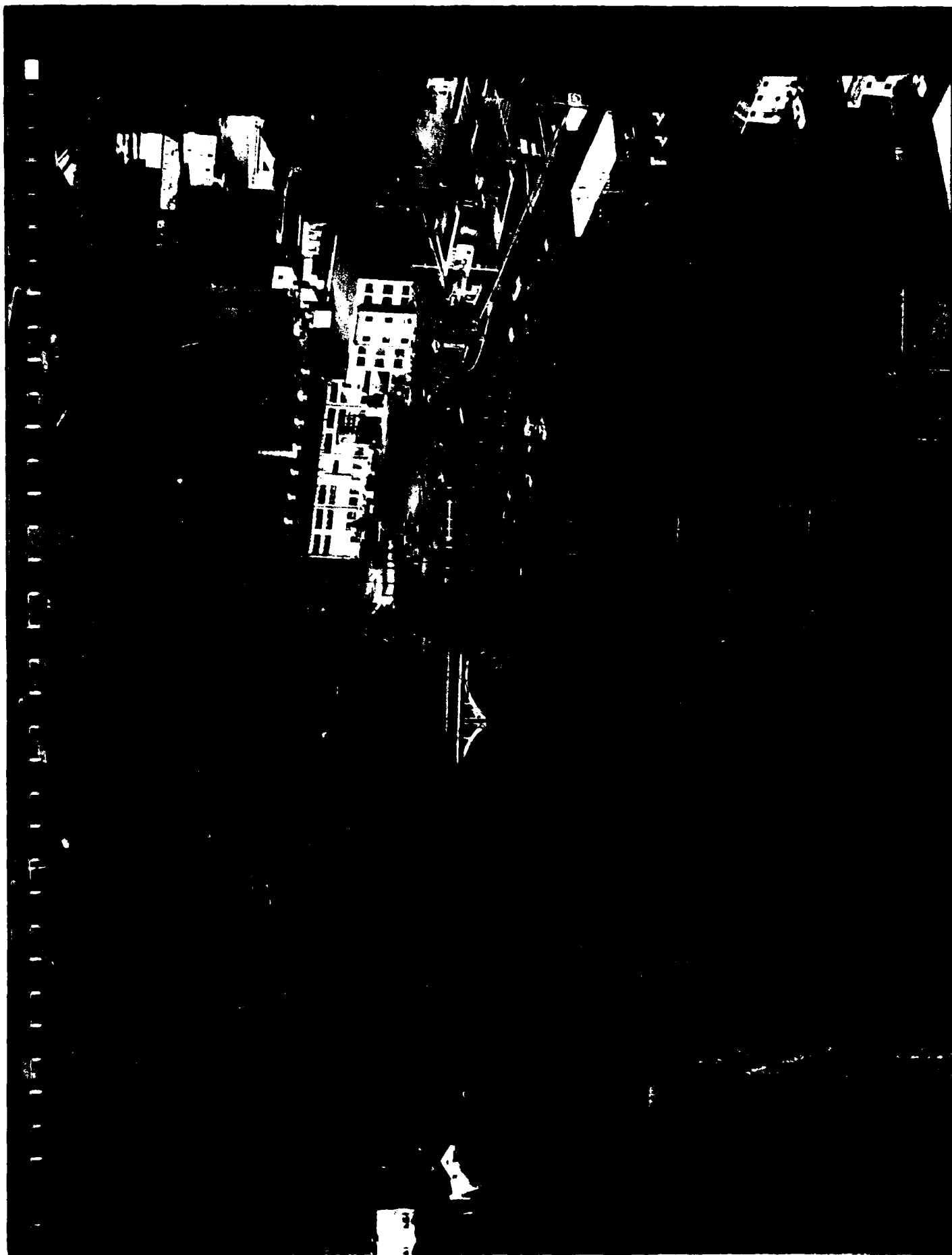
2.1 Design Data	10
2.2 Construction Data	10
2.3 Operation Data	10
2.4 Evaluation of Data	10

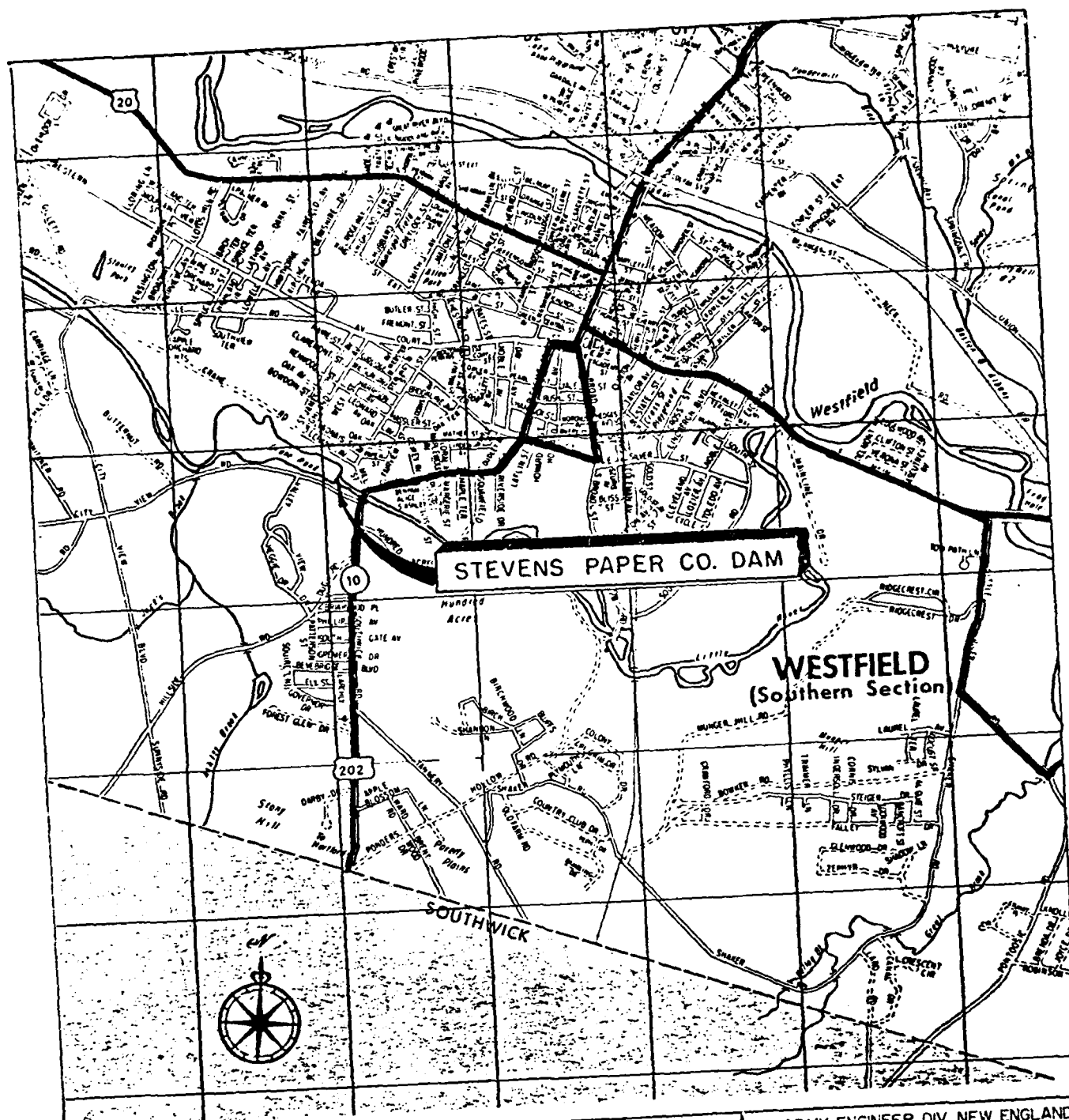
<u>Section</u>	<u>Page</u>
3. VISUAL INSPECTION	
3.1 Findings	12
a. General	12
b. Dam	12
c. Appurtenant Structures	13
d. Reservoir Area	14
e. Downstream Channel	14
3.2 Evaluation	15
4. OPERATIONAL PROCEDURES	
4.1 Procedures	16
4.2 Maintenance of Dam	16
4.3 Maintenance of Operating Facilities	16
4.4 Description of any Warning System in Effect	17
4.5 Evaluation	17
5. HYDRAULIC/HYDROLOGIC	
5.1 Evaluation of Features	18
a. General	18
b. Design Data	18
c. Experience Data	18
d. Visual Observation	19
e. Overtopping Potential	19
f. Dam Failure Analysis	20
6. STRUCTURAL STABILITY	
6.1 Evaluation of Structural Stability	21
a. Visual Observation	21
b. Design and Construction Data	21
c. Operating Records	21
d. Post-Construction Changes	21
e. Seismic Stability	22

<u>Section</u>	<u>Page</u>
7. ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES	
7.1 Dam Assessment	23
a. Condition	23
b. Adequacy of Information	23
c. Urgency	23
d. Need for Additional Investigation	23
7.2 Recommendations	23
7.3 Remedial Measures	24
a. Operation and Maintenance Procedures	24
7.4 Alternatives	24

#### APPENDIXES

APPENDIX A - INSPECTION CHECKLIST	A-1
APPENDIX B - ENGINEERING DATA	B-1
APPENDIX C - PHOTOGRAPHS	C-1
APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS	D-1
APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS	E-1





HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

U.S. ARMY ENGINEER DIV. NEW ENGLAND  
CORPS OF ENGINEERS  
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

STEVENS PAPER CO. DAM  
(LOWER DAM)

WESTFIELD

MASSACHUSETTS

SCALE 1" = 5280'

DATE FEBRUARY, 1979

PHASE I  
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: STEVENS PAPER COMPANY

SECTION 1  
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 28 November 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW 33-79-C-0012 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The Stevens Paper Company - Lower Dam is located in the City of Westfield in Hampden County, Massachusetts. The Pond is called Crane Pond and is on the Little River. The dam is located within the southwest part of Westfield approximately 400 feet west of where Route 202 and Route 10 intersect the Little River. The dam is shown on the Southwick Quadrangle, Massachusetts-Connecticut, with the approximate coordinates of North  $42^{\circ}06'42''$ , West  $72^{\circ}46'00''$ .

b. Description of Dam and Appurtenances

The dam consists of a masonry spillway, an earthfill embankment and two outlet pipes. The spillway has a height of about 12 feet, a crest width of about 190 feet and a crest

thickness of about 13 feet. It has a concrete cap and three concrete ice breakers located on the crest. The abutments are made of concrete, with portions comprised of masonry from a prior dam. The earthen embankment has a length of about 360 feet and contains a sheet pile cutoff wall. The upstream face of the embankment has a slope of 2 horizontal to 1.0 vertical and is lined with riprap. The downstream face also has a 2:1 slope and is turf lined. The outlets consist of a four foot diameter drawdown sluiceway and an 18 inch process water intake. The drawdown is located  $9\frac{1}{2}$  feet to the right of the spillways left abutment. It is hand operated by a series of shafts and gears. The process water intake is located within this same abutment and feeds water into the adjacent paper mill.

c. Size Classification

The dam is classified as intermediate due to its hydraulic height of 25 feet and storage capacity of 1591 a-f. The preceding being based on measurements to the top of embankment elevation 175.0.

d. Hazard Classification

The hazard potential from dam failure has been considered under two assumptions. One assumption is with water to the top of dam elevation 175.0. Under this condition, water passing the spillway section is such that major flooding has already occurred downstream and dam failure will not significantly increase damage. The second

condition is with water at crest of spillway. The outflow from this condition should be retained within the downstream channel. The hazard classification from dam failure therefore is low.

e. Ownership

The dam is owned by the Stevens Paper Mills, Inc., 77 Mill Street, Westfield, Massachusetts, 01085.

f. Operator

The caretaker of the dam is Mr. Robert Rea, of Stevens Paper Mills, Inc., 77 Mill Street, Westfield, Massachusetts, 01085. Telephone - 413-562-2315.

g. Purpose of Dam

The major purpose of the dam is for water supply for the adjacent mill. Formally the dam was used in power generation.

h. Design and Construction History

There are no plans available indicating when the original dam was constructed. It is assumed that the original dam was built around the turn of the century and was damaged by the flood of 1955. The original dam was then modified and rebuilt in 1957, resulting in the existing structure. The 1957 renovations were designed by Stone and Webster Engineering Corporation of Boston in 1955. This work consisted of lowering the spillway approximately five

feet, installing a concrete cap, a sheetpile cutoff wall within the upstream north embankment and repairing the northwesterly abutment. Portions of masonry from the original dam are incorporated into the existing structure.

i. Normal Operational Procedure

There is no formal operational procedure for the dam. The 18" supply pipe to the mill is operated periodically and was last operated in November, 1978; the drawdown has not been operated since 1957 and is in questionable condition.

1.3 Pertinent Data

a. Drainage Area

Drainage area (53,888. acres - 84.2 s.m.) is comprised of wooded, rolling hills (90 percent of area) and long, flat flood plains (10 percent of area). The major drainage paths area along the Little River (8.5 miles) and Munn Brook (10 mi.). There are numerous smaller brooks and several lakes and ponds within the drainage area.

A major portion of the drainage area (29,312 acres - 45.8 square miles) flows into Cobble Mountain Reservoir. Outflow from the reservoir is controlled (water supply and power) and the water level is usually well below the spillway crest. Its influence on the control of storm water runoff to the Little River is significant.

Development throughout the area is scattered and basically rural. Urban development occurs to the north and east of the Little River in the City of Westfield.

Below the dam, to the northeast is the City of Westfield and a very large flood plain area. There are many structures adjacent to the flood plain. Three miles below the dam, the Little River flows into the Westfield River.

b. Discharge at the Dam Site

There are two outlet pipes at the dam. These are a 48" O.D. and an 18" I.D. pipe at elevation  $149.8^+$  and  $153.3^+$ , respectively. The 48" pipe extends through the dam and was used as a drain line. The 18" pipe is operated periodically and is used to bring water inside the adjacent mill for various uses.

The original dam, built prior to 1900, was damaged during the August 19, 1955 hurricane. At that time, estimates of the flood runoff at the dam were made. These vary from 21,700 to 23,100 cfs.

The existing ungated spillway has a capacity of approximately 39,000 cfs at the top of the dam, elevation 175. The flood of August 19, 1955 (23,100 cfs) peaked at elevation  $170.5^+$ . The spillway has a capacity of 39,000 cfs at elevation  $175.0^+$ .

c. Elevation (feet above MSL)

(1)	Streambed at centerline of dam . . . . .	150 <sup>±</sup>
(2)	Maximum tailwater . . . (Backwater condition).	175 <sup>±</sup>
(3)	Upstream portal invert diversion tunnel. . . .	N/A
(4)	Recreation pool . . . (spillway crest) . . . .	159.8
(5)	Full flood control pool. . . . .	N/A
(6)	Spillway crest (ungated) . . . . .	159.8
(7)	Design Surcharge (1957 design) . . . . .	172.5
(8)	Top Dam (South abutment) . . . . .	176.0
	(North abutment) . . . . .	175.0
(9)	Test flood design surcharge (1/2 PMF) . . . . .	176.0

d. Reservoir

(1)	Length of maximum pool . . . . .	7000'
(2)	Length of recreation pool . . . . .	2000'
(3)	Length of flood control pool . . . . .	N/A

e. Storage (acre-feet)

(1)	Recreation pool. . . . .	276.0
(2)	Spillway crest pool . . . . .	276.0
(3)	Top of Dam . . . . .	1591.0
(4)	Flood control pool . . . . .	N/A
(5)	Test flood pool . . . . .	1732.0

## f. Reservoir Surface (acres)

(1) Recreation Pool . . . . .	50
(2) Spillway crest . . . . .	50
(3) Top dam . . . . .	137
(4) Flood-control pool . . . . .	N/A
(5) Test flood pool . . . . .	145

g. Dam

(1) Type . . gravity, stone masonry and concrete, earth	embankment
(2) Length . . . . .	550'
(3) Height . . . 10' to 12 ' spillway, 30' earth	embankment
(4) Top Width . . . . . embankment area . . . . .	20 <sup>+</sup>
(5) Side Slopes . . . 2:1 <sup>+</sup> rip-rap U/S . . . . . 2:1 <sup>+</sup> D/S	
(6) Zoning . . . class A & B fill material indicated, 2 zones	
(7) Impervious Core . . . indicated as Class A fill on dam	
(8) Cutoff . . . . . sheetpiling in earth dam . . . . .	350 <sup>+</sup>
(9) Grout curtain . . . . .	NONE

#### h. Diversion and Regulating Tunnel

None

i. Spillway

- (1) Type . . . . . straight "broad crest"
- (2) Length of weir . . 168' (main) . . . . 23.3'±(secondary)
- (3) Crest elevation . . 159.8<sup>±</sup> (main) . . 164.5<sup>±</sup>(secondary)
- (4) Gates . . . . . one 48" Ø waste
- (5) U/S Channel . . . . sloped concrete (1:1<sup>±</sup>) to river bed
- (6) D/S Channel . . . . . vertical drop to river bed

j. Regulating Outlets

The dam has two manually controlled regulating outlets. These are sluice gates which are used to regulate flow through the 48 inch and 18 inch outlet pipes. The 48 inch pipe, invert 149.8<sup>+</sup>, extends through the spillway and was used as a drain. It has not been used since 1957. The 18 inch pipe, invert 153.3<sup>+</sup>, is in the spillways left abutment. It carries water into the manufacturing building (adjacent to the river and dam) for various uses. The gate for this pipe is operated periodically and was last operated in late November of 1978.

SECTION 2  
ENGINEERING DATA

2.1 Design

There were no plans discovered describing the original dam located at this site. This original structure was damaged by the flood of 1955. The existing dam utilized portions of the original dam. Plans outlining these repairs and remodeling, were provided by the Stevens Paper Company. The plans were prepared by Stone & Webster Engineering Corporation of Boston in 1955. No indepth design calculations were located for this dam, by the design Engineer. Limited information was provided by the owner.

2.2 Construction

No construction data was located for this dam.

2.3 Operation

No operational manual was located for this dam.

2.4 Evaluation

a. Availability

Plans outlining the 1957 renovations and a 1955 design sheet for flood discharge were made available by the Stevens Paper Company. State Inspection Reports from the years 1973, 1975, and 1976 along with some correspondence were located at the Department of Environmental Quality Engineering Division of Waterways, Boston Office.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of indepth design calculations, but must be based primarily on the visual inspection, past performance history, and hydrologic and hydraulic assumptions.

c. Validity

The field investigation indicates that the external features substantially agree with those shown on the furnished plan.

SECTION 3  
VISUAL INSPECTION

3.1 Findings

a. General

The Stevens Paper Company Lower Dam was inspected on December 5, 1978. At that time, water was passing over the spillway approximately one inch deep. The upstream face of the dam could only be inspected above this water surface.

b. Dam

The dam consists of a masonry overflow spillway about 230 foot long with its right abutment founded on the right bank of the Little River. The left training wall is concrete and masonry structure which, is the retaining wall of an embankment section which continues about 360 feet to the left abutment. Photo 3 shows the embankment section of the dam. The maximum height of the embankment section is about 30 feet.

Visual inspection of the dam indicates it is in good condition.

Upstream Slope

The embankment was constructed with an upstream slope of 1V:2H. Riprap slope protection extends from the toe to the crest of the embankment as shown in Photos 5 and 6. Concrete has been placed on the riprap section from the left training wall towards the left abutment for a distance of about 150 feet. There were no visible slumps or evidence of sliding on the upstream face.

### Crest

The crest of the embankment is of variable width due to topographic conditions at the site and is 20 feet wide at its narrowest point. The crest is shown in photo 4. It has good grass cover and no evidence of cracking or misalignment of the crest was observed.

### Downstream Slope

The downstream face of the embankment was constructed on a slope of about 1V:2H and has a good grass cover.

The downstream slope is curved in plan view to meet a roadway passing at the toe of the embankment. The downstream face is shown in photos 3 and 7.

The water level in the reservoir was below or only slightly above the elevation of the downstream toe at the time of inspection.

### c. Appurtenant Structures

The foundation of the masonry spillway could not be inspected because of flow over the spillway. The spillway appeared to be in good condition, true and straight, with no signs of misalignment. The right abutment of the spillway is founded on bedrock which can be seen in photo 8. The left abutment and training wall of the spillway is a concrete and masonry wall which forms a retaining wall for the embankment section. This wall is shown in photos 2 and 9. The embankment adjacent to this training wall shows no evidence of misalignment or movement.

The process water intake is located in the left abutment of the spillway. The intake gate was last operated in November of 1978.

The main drawdown pipe is located at the left end of the spillway approximately 4 feet above the river bottom. Water flowing over the spillway prevented unobstructed observation. According to the caretaker this outlet was last operated over 20 years ago. There is uncertainty regarding the condition of this facility and it was not operated during our inspection for fear of not being able to close it down once opened. Downstream of the right side of the spillway there is heavy erosion at the base of a concrete retaining wall, as shown in photo 14. This erosion is serious and could jeopardize the wall. The spillway would not be affected by failure of this wall. Failure could however, affect the roadway running parallel to and above this wall.

d. Reservoir Area

The surrounding area of the reservoir is tree lined and appears to be in general agreement with the U.S.G.S. map. A description of the drainage area is given in Section 1.3.a of this report. The amount of siltation in the reservoir is unknown.

e. Downstream Channel

The downstream channel is the natural river bed. No significant obstructions existed in the channel at the time of inspection. The slopes of the channel are relatively steep and contain riprap lining on the immediate left down-

stream area. There is a two span concrete arch bridge spanning the Little River an estimated 450 feet downstream of the dam. Photos 10 and 12 show the downstream channel.

### 3.2 Evaluation

Visual examination indicates that the embankment section of the dam is in good condition. The condition of the spillway appeared to be good, however, water passing over the spillway limited the inspection. The main drawdown appears to be inoperative and this condition should be corrected. The concrete retaining wall located downstream of the right side of the spillway is in poor condition. This wall will not effect the stability of the dam, however, failure of the wall could effect the adjacent roadway.

SECTION 4  
OPERATIONAL PROCEDURES

4.1 Procedures

There is no formal operational procedure for the dam. The dam is used for water supply for the adjacent paper mill. The process water intake pipe is operated periodically and was last operated in November, 1978. The main 48 inch diameter drawdown for this facility has not been operated since 1957.

4.2 Maintenance of Dam

The dam is maintained by the Stevens Paper Mill, Inc., of Westfield, Massachusetts. There is no formal maintenance program for the dam. The owner is responsible for reviewing State Inspection Reports and instituting the necessary repairs. Recent maintenance has consisted of controlling upstream vegetation and repairing the control mechanism for the process water intake pipe.

4.3 Maintenance of Operating Facilities

There is no formal operational facility maintenance program. Stevens Paper Mill, Inc., has repaired the process water intake facility. They have not conformed to the States recommendations to insure the operation of the drawdown gate.

#### 4.4 Description of Warning System

There are no warning systems in effect at this facility.

#### 4.5 Evaluation

There are no formal maintenance programs outlined.

Some of the recommended repairs have been followed. However, the drawdown gate has not been operated since 1957. Any repairs required should be made and the gate maintained in operable condition. The dam should be inspected every two years by qualified personnel who can identify conditions which if left unchecked could jeopardize the safety of the dam.

SECTION 5  
HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General

The dam is a "run-of-the-river" type project. It was originally constructed about 1900 to provide power for the mill adjacent to the river. A section of the original gravity stone masonry dam was damaged during the August 19, 1955 flood. It was rebuilt in 1957. The spillway is founded on a rock outcrop and the spillway crest is capped with concrete. The earthen embankment contains a sheet piling cut-off wall and impervious fill material, with a riprapped upstream slope.

The Little River begins at the Cobble Mountain Reservoir. Above Cobble Mountain about 45 s.m. of land contributes runoff. There was either no discharge or controlled discharge of water from Cobble Mountain and several other reservoirs during the 1955 flood.

b. Design Data

The dam was originally built about 1900. The dam was "redesigned" by Stone & Webster and rebuilt in 1957.

c. Experience Data

Records indicate the August 19, 1955 flood produced about 21,700 to 23,100 cfs at the dam. The original dam spillway crest was at elevation 164.5<sup>+</sup>. The 1957 modifications lowered this to 160<sup>+</sup>. A 1955 design sheet for flood discharge

indicates that at elevation 175 a flow of 45,250 cfs could pass through the spillway.

d. Visual Observations

Visual observations indicate that backwater condition will exist due to bridges, railroad lines and the Westfield River.

e. Overtopping Potential

The total area which could drain into the Little River comprises 84.2 s.m. A test flood using 1/2 PMF criteria was used to evaluate the project. Due to the large urban area downstream of the dam, the 1/2 PMF for the entire drainage area was used. This would include flow out of any reservoir in the area. The record flood of 23,100 cfs and design flood of 34000 cfs were also investigated.

The test flood would flow one foot above (elev. 176) the crest of the earth embankment. A detailed analysis might show that the original engineers discharge curve is accurate, thus the spillway could pass the 1/2 PMF of 42,100 cfs without the one foot overtopping. Our calculations indicate a spillway capacity of approximately 39,000 cfs with water to dam crest (elevation 175).

Due to conditions downstream, a backwater condition would exist. Flooding would be influenced by the Westfield River. At 1/2 PMF, storage at elevation 176 would be 1456 a-f. The test flood outflow would be 40,372 cfs.

f. Dam Failure Analysis

With water at the top of the dam, elevation 175 to 176, (1/2 PMF condition) if the dam were to fail, the effects would not be significantly different from the 1/2 PMF tailwater and backwater conditions downstream. The flood plain below the dam would already be flooded by the 1/2 PMF outflow from the dam. The Town of Westfield would be flooded to approximately elevation 155. Several hundred structures would be damaged by floodwater. A detailed study would be required to determine the exact impact in this area due to the influence of the Westfield River. The August 19, 1955 flood is known to have reached elevation 150<sup>+</sup> in Westfield. Extensive flood damage and possible loss of life could occur due to the flooding conditions but not dam failure.

Assuming the dam failed, with water at the spillway level, elevation 160<sup>+</sup>, the resulting outflow would be 7424 cfs. This flow should be retained within the river banks and adjacent low flood plains. Damage to homes and loss of life are not indicated.

SECTION 6  
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Visual observations did not disclose any immediate stability problems.

b. Design and Construction Data

The dam consists of a 230 foot long masonry spillway extending from the right bank of the river to a concrete and masonry training wall which forms the abutment for a 360 foot long embankment dam section extending to the left abutment.

Details of the embankment construction were not available with the exception of design drawings dated 1955 which indicate the embankment section has a sheet pile cut-off wall and a central core above the cut-off wall. The cut-off wall extends from the left training wall of the spillway to a point about 200 feet towards the left abutment.

c. Operating Records

There is no operational manual for this dam.

d. Post-Construction Changes

The available information indicates that the present embankment was reconstructed in about 1957 after extensive damage to the original dam due to flooding in 1955. The spillway was lowered by approximately 5 feet from the original and a concrete cap and icebreakers were constructed

atop the spillway crest.

e. Seismic Stability

The dam is located in Seismic Zone 2, and according to USCE guidelines, it is assumed that there is no hazard from earthquake loading.

SECTION 7  
ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

The visual inspection indicates the embankment portion of the dam is in good condition. Close examination of the spillway was not possible due to water overflow. However, the spillway appeared to be true and straight with no signs of misalignment.

b. Adequacy of Information

The information made available along with the visual inspection is adequate for a Phase I Level investigation of the embankment section of this dam. The spillway section could not be thoroughly inspected at the time of this inspection.

c. Urgency

No action for the embankment section is required. However, the items outlined in Section 7.2 and 7.3 should be implemented by the owner within 2 years after receipt of this Phase I Report.

d. Need for Additional Investigation

The masonry spillway could not be evaluated during this inspection. The spillway should be inspected within the time frame established in Section 7.1.c.

7.2 Recommendations

1. The drawdown gate has not operated since 1957. The condition of this facility should be evaluated and

any necessary repairs made to assure the gate is operable.

2. Upon repair of the drawdown, or during a period of low flow , the owner should engage a qualified engineer to inspect the spillway section, without water flowing over it.
3. Although failure of the retaining wall downstream of the right side of the spillway would not affect the safety of the dam; the owner of this wall should be determined. The owner should then engage a qualified engineer to investigate the condition of the wall and recommend necessary repairs to assure the safety of the adjacent roadway.

#### 7.3 Remedial Measures

##### a. Operational and Maintenance Procedures

1. The dam should be inspected every two years by qualified personnel who can identify conditons which if left unchecked could jeopardize the safety of the dam. Coordination should be made so that the spillway can be inspected without it being overtopped by water.

2. The drawdown gate should be operated yearly to insure continued adequacy.

#### 7.4 Alternatives

Not applicable to this dam.

APPENDIX A  
INSPECTION CHECKLIST

PROJECT Stevens Paper Co. - Lower Dam

TIME 1:30 p.m.

W.S. ELEV. 159.9+ U.S.        DN.S.

1. Ronald H. Cheney, HH&B	6.
2. David B. Vine, HH&B	7.
3. Daniel P. LaGatta, GEI	8.
4. Robert Rea, Stevens Paper	9.
5.	10.

PROJECT FEATURE		INSPECTED BY	REMARKS
1.	Embankment Dam	D. P. LaGatta	
2.	Spillway	R. H. Cheney	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

# PERIODIC INSPECTION CHECKLIST

PROJECT Stevens Paper Co. - Lower Dam DATE Dec. 5, 1978  
 PROJECT FEATURE Embankment Dam NAME D. P. LaGatta  
 DISCIPLINE Geotechnical engineers NAME R. H. Cheney  
Structural Engineer

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	175
Current Pool Elevation	159.9
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	No pavement.
Movement or Settlement of Crest	None observed.
Lateral Movement	None observed.
Vertical Alignment	No misalignment observed.
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	Good.
Indications of Movement of Structural Items on Slopes	None.
Trespassing on Slopes	None.
Sloughing or Erosion of Slopes or Abutments	None.
Rock Slope Protection - Riprap Failures	None.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	None observed.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None.
Vegetation	Good grass cover on crest and d.s. slope

PERIODIC INSPECTION CHECK LIST

PROJECT <u>Stevens Paper Co. - Lower Dam</u>		DATE <u>Dec. 5. 1978</u>
PROJECT FEATURE <u>Intake Structure</u>		NAME <u>D. P. LaGatta</u>
DISCIPLINE <u>Geotechnical Engineer</u>		NAME <u>R. H. Cheney</u>
Structural Engineer		
AREA EVALUATED		CONDITIONS
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u> a. Approach Channel Slope Conditions Bottom Conditions Rock Slides or Falls Log Boom Debris Condition of Concrete Lining Drains or Weep Holes b. Intake Structure Condition of Concrete Stop Logs and Slots		<p>There is no approach channel for this facility.</p> <p>An 18 inch water process inlet is located in the left abutment.* The above water portion of this abutment was observed to be in good condition. The facility was last operated Nov. of 1978. The 48 inch diameter drawdown inlet is located underwater and could not be visually observed. The facility has not been operated in over 20 years.</p> <p>* Abutment is left abutment of spillway</p>

# PERIODIC INSPECTION CHECK LIST

PROJECT Stevens Paper Co - Lower Dam DATE Dec. 5, 1978  
 PROJECT FEATURE Outlet-Inlet Controls NAME D. P. LaGatta  
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney  
Structural Engineer

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	
General Condition	The upper portion of the left*abutment contains a fenced off area containing the inlet gate controls. Visual observation indicated the general area to be in good condition.
Condition of Joints	
Spalling	* Abutment is left abutment of spillway
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	The 18 inch water process inlet is manually controlled and operational. The 48 inch diameter drawdown pipe is manually operated through a system of shafts and gears. The drawdown has not been operated in over 20 years and believed inoperable.
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System in Gate Chamber	

# PERIODIC INSPECTION CHECK LIST

PROJECT Stevens Paper Co. - Lower Dam DATE Dec. 5, 1978  
 PROJECT FEATURE Outlet Transition & Conduit NAME D. P. LaGatta  
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney  
Structural Engineer

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u>  General Condition of Concrete  Rust or Staining on Concrete  Spalling  Erosion or Cavitation  Cracking  Alignment of Monoliths  Alignment of Joints  Numbering of Monoliths	  There is no standard transition and conduit for this facility. There is an 18 inch water process intake pipe supplying water to the mill, however, the entire conduit is underground and unable to be visually inspected.
	5

# PERIODIC INSPECTION CHECK LIST

PROJECT Stevens Paper Co. - Lower Dam DATE Dec. 5, 1978  
 PROJECT FEATURE Outlet Structure & Channel NAME D. P. LaGatta  
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney  
Structrual Engineer

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>  General Condition of Concrete Rust or Staining Spalling Erosion or Cavitation Visible Reinforcing Any Seepage or Efflorescence Condition at Joints Drain Holes Channel Loose Rock or Trees Overhanging Channel Condition of Discharge Channel	The outlet structures are the same as the inlet structures for this facility. There is no outlet channel less the downstream channel of the spillway.

# PERIODIC INSPECTION CHECK LIST

PROJECT Stevens Paper Co. - Lower Dam

DATE Dec. 5, 1978

PROJECT FEATURE Embankment Dam

NAME D. P. LaGatta

DISCIPLINE Geotechnical Engineer

NAME R. H. Cheney

Structural Engineer

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Run-of-river spillway
General Condition	Good.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	None.
Floor of Approach Channel	Not visible.
b. Weir and Training Walls	Water passing over the spillway limited the visual inspection. The spillway appeared to be well aligned and true. The training walls of the spillway are the abutments. The abutments appear to be structurally sound with only minor waterwear.
General Condition of Concrete	
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	Not working at time of inspection.
c. Discharge Channel	Discharge directly into river channel.
General Condition	
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	None.
Floor of Channel	Not visible.
Other Obstructions	
	7

# PERIODIC INSPECTION CHECK LIST

PROJECT Stevens Paper Co. - Lower Dam DATE Dec. 5, 1978  
 PROJECT FEATURE Service Bridge NAME R. P. LaGatta  
 DISCIPLINE Geotechnical Engineer NAME R. H. Cheney  
Structural Engineer.

AREA EVALUATED	CONDITIONS
<u>OUTLET WORKS - SERVICE BRIDGE</u> a. Super Structure Bearings Anchor Bolts Bridge Seat Longitudinal Members Under Side of Deck Secondary Bracing Deck Drainage System Railings Expansion Joints Paint b. Abutment and Piers General Condition of Concrete Alignment of Abutment Approach to Bridge Condition of Seat and Backwall	<p>There is no service bridge for this facility. There is a fenced in gate control area on the left abutment which was discussed on Page 4 of this section as the control tower.</p>
	8

APPENDIX B  
ENGINEERING DATA

LIST OF AVAILABLE ENGINEERING DATA

1. 1955 Plans outlining repairs and remodeling
2. Design folder covering 1955 Design

Location: Stevens Paper Mills, Inc.  
77 Mill Street  
Westfield, Massachusetts 01085



11-11-16 6/8/16  
*The Commonwealth of Massachusetts*

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.  
DIVISION OF WATERWAYS

*100 Nashua Street, Boston 02111*

June 3, 1976

Stevens Paper Mill, Inc.  
77 Mill Street  
Westfield, Massachusetts

RE: Dam #2-7-329-5  
Westfield  
Stevens Paper Co. Lower Dam

Gentlemen:

On January 14, 1976, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Stevens Paper Mill, Inc. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams-Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however the following conditions were noted that require attention:

1. A growth of brush was noted on the upstream face. This should be removed.
2. The drawdown gate is not operable and must be repaired.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the Dam as indicated above.

Very truly yours,

DAVID STANDLEY  
COMMISSIONER

A. X. X. X.

# INSPECTION REPORT - DAMS AND RESERVOIRS

## 1. LOCATION:

City/Town Westfield . County Hampden . Dam No. 2-7-329-5 .

Name of Dam Stevens Paper Co. - Lower Dam .

Mass. Rect.

Topo Sheet No. 9 D . Coordinates: N 407,500 , E 256,300 .

Inspected by: Harold T. Shumway , On Jan. 14, 1976 . Date 12-3-73 . Last Inspection

## 2. OWNER/S: As of January 14, 1976

per: Assessors \_\_\_\_\_, Reg. of Deeds \_\_\_\_\_, Prev. Insp. X , Per. Contact X .

1. Stevens Paper Mills, Inc., 77 Mill St., Westfield, Mass.

Name	St. & No.	City/Town	State	Tel. No.

2. \_\_\_\_\_

Name	St. & No.	City/Town	State	Tel. No.

3. \_\_\_\_\_

Name	St. & No.	City/Town	State	Tel. No.

## 3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Plant Engineer, Mr. Robert Ray,

Stevens Paper Mills, Inc., 77 Mill St., Westfield, Mass. 01085

Name	St. & No.	City/Town	State	Tel. No.

## 4. DATA:

No. of Pictures Taken none . Sketches See description of Dam.

Plans, Where In office files of Stevens Paper Mills, Inc. at 77 Mill St., Westfield, Mass. - Plans for 1955 remodeling of dam.

## 5. DEGREE OF HAZARD: (if dam should fail completely)\*

1. Minor \_\_\_\_\_ . 3. Severe \_\_\_\_\_ .

2. Moderate X \_\_\_\_\_ . 4. Disastrous \_\_\_\_\_ .

Comments: 70 million gallons  $\pm$  impoundment, flood plain downstream heavily developed.

\*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

Main Dam - conc. capped crest spillway - 168'W.  
No. 1 Location and Type: 4.76'H. with stone masonry dropwall.

Controls none, TYPE: \_\_\_\_\_.

Automatic \_\_\_\_\_. Manual \_\_\_\_\_. Operative Yes \_\_\_\_\_, No \_\_\_\_\_.

Comments: Ice breakers on crest - appear in good condition.

Bottom of dropwall - 9.5' from south abut. - 48"  
No. 2 Location and Type: dia. pipe drawdown.

Controls yes, Type: Sluice gate.

Automatic \_\_\_\_\_. Manual X. Operative Yes \_\_\_\_\_, No X.

Sluice gate operated by hand stand on north abut. thro  
Comments: a system of shafts and gears which activate a rack and  
pinion at gate. All mechanism is under water. First shaft rusted

No. 3 Location and Type: Near westerly end, north abut. - 18" dia. water intake

Controls yes, Type: 18" dia. gate operated from hand stand on

Automatic \_\_\_\_\_. Manual X. Operative Yes X, No \_\_\_\_\_.

Comments: Controls repaired since last inspection.

Drawdown present Yes X, No \_\_\_\_\_. Operative Yes \_\_\_\_\_, No X.

Comments: See #2 above.

7. DAM UPSTREAM FACE: 1:1 on masonry spillway  
Slope 3:1 on Embank. Depth Water at Dam 8' to 10'.

Material: Turf X. Brush ~~XXXXX~~ X. Rock fill X. Stone  
Masonry X. Wood X

Other Approx. 350' earth dike on northwesterly end of masonry. Rock  
paved slope with turf on upper 3' +.

Condition: 1. Good \_\_\_\_\_. 3. Major Repairs \_\_\_\_\_.

2. Minor Repairs X. 4. Urgent Repairs \_\_\_\_\_.

Comments: Small brush growth along water line on slope where stone  
fill paving is.

8. DAM DOWNSTREAM FACE: Vertical on spillway dropwall  
Slope 3:1 on embankment.

Material: Turf X. Brush & Trees \_\_\_\_\_. Rock Fill \_\_\_\_\_. Stone  
Masonry X. Wood X

Other Concrete cap on crest.

Condition: 1. Good \_\_\_\_\_. 3. Major Repairs \_\_\_\_\_.

2. Minor Repairs X. 4. Urgent Repairs \_\_\_\_\_.

Comments: Small brush growth on westerly abut. retaining wall. Heavy  
overflow prevented close inspection of dropwall.

9. EMERGENCY SPILLWAY: Available yes. Needed       .

Height Above Normal Water: 4.76 Ft. above crest spillway.

Width 191.32 Ft. Height 10.4 Ft. Material Masonry.

Condition: 1. Good X, 3. Major Repairs       .

2. Minor Repairs       . 4. Urgent Repairs       .

Comments: Additional capacity spillway from crest of original dam at  
elev. 164.56 to top of northwesterly abutment and embankment.

10. WATER LEVEL AT TIME OF INSPECTION: 1 Ft. Above X. Below       .

Top Dam        F.L. Principal Spillway X.

Other       .

Normal Freeboard 15.2 Ft. from spillway crest to top of northwester  
abutment.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment yes - medium small brush growth.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam None found.

Cracked or Damaged Masonry None found.

Evidence of Seepage yes - minor seepage noted in westerly abut.

Evidence of Piping None found.

Leaks None found.

Erosion Minor water wear on abutment faces at crest.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other Drawdown gate does not operate.

(12.)

## OVERALL CONDITION:

1. Safe \_\_\_\_\_.
2. Minor repairs needed     X
3. Conditionally safe - major repairs needed \_\_\_\_\_
4. Unsafe \_\_\_\_\_.
5. Reservoir impoundment no longer exists (explain)  
Recommend removal from inspection list \_\_\_\_\_

(13.)

## REMARKS AND RECOMMENDATIONS: (Fully Explain)

Water overflow at time of inspection was a foot deep which prevented a close inspection of crest, dropwall face, or toe of dam. Condition appeared to be the same as when dam was last inspected on December 3,

A growth of brush was noted on upstream slope of earth embankment at water line. Some of this brush has reached the small tree stage and has evidently been growing for more than two years.

Ice formation on the westerly abutment face seemed to indicate that slight seepage was occurring. However, this does not appear to be a problem at present time. Slight wear of abutment faces at crest of spillway was noted. This also does not appear to be a problem as yet and does not seem to have increased since last inspection.

The control mechanism for the 18" dia. pipe feeding processing water to the mill has been repaired and is in good working order now per Mr. Robert Ray, Plant Engineer.

The drawdown gate is not operable and the control shaft is rusted off. This situation was discussed with Mr. Ray who stated he did not know when the company would be able to repair this control system due to present economic situation.

Dam appears to be basically sound and safe with only routine repairs needed except for drawdown gate repairs.

HTS/bk

September 2, 1975

Mr. Earl Fuller  
Plant Engineering Department  
Stanley Home Products, Inc.  
Easthampton, Mass. 01027

RE: Dms 62-7-529-5 and 6  
Westfield  
Crane Pond Lower and Upper Dams

Dear Mr. Fuller:

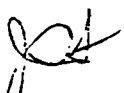
Reference is made to your letter dated August 28, 1975, wherein you have expressed an interest to know who would have the responsibility for the repair and maintenance of the above dams.

Chapter 26B of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1973 (Dams-Safety Act) has placed the jurisdictional responsibility for dams with the Commissioner of the Massachusetts Department of Public Works. The Division of Highways of the Department of Environmental Quality Engineering, has been administering this program. A copy of Chapter 595 is enclosed for your information. Your attention is directed to Sections 46 through 49 which address the area of maintenance responsibility.

These dams were inspected in December of 1973 and appeared safe at that time with only routine deficiencies noted. Pursuant to Chapter 595 these dams are scheduled to be inspected in December of this year.

If we may be of future assistance, please do not hesitate to contact us. With any correspondence, please include the number/s of the dam/s as indicated above.

Very truly yours,

  
Mr. P. J. Hoey  
Mr. Mills

ROBERT L. TIERNEY, P.E.  
Chief Engineer

January 30, 1973

Stevens Paper Mills Inc.  
c/o Robert Ray, Plant Engineer  
77 Mill Street  
Westfield, Massachusetts 01085

RE: Inspection-Dam #2-7-329-5  
Westfield  
Stevens Paper Co. Lower Dam

Dear Mr. Ray:

On December 3, 1973 an engineer from the Massachusetts Department of Public Works inspected the above dam, owned by Stevens Paper Mills Inc.

The inspection was made in accordance with Chapter 253 of the Massachusetts General Laws, as amended by Chapter 595 of the Acts of 1970.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

1. Installation of the gate for the intake pipe. You had indicated that this gate was removed for repairs.
2. Remove the minor growth of brush growing between the riprap.
3. Check the drawdown gate and make it operable, if necessary.

We call these conditions to your attention now, before they become serious and more expensive to correct.

Very truly yours,

*F. C. Schweilm*  
FRED C. SCHWEILM, P.E.  
Deputy Chief Engineer

*IRA:vlc*  
IRA:vlc  
cc. F. J. Moay  
R. Salls

# INSPECTION REPORT - DAMS AND RESERVOIRS

1.

## LOCATION:

City/~~Box~~ Westfield . County Hampden . Dam No. 2-7-329-5 .

Name of Dam Stevens Paper Co. - Lower Dam .

Mass. Rect.

Topo Sheet No. 9D . Coordinates: N 407.500 , E 256.300 .

Inspected by: Russell C. Salls, P.E., On Dec. 3, 1973 . Date June, Last Inspection 1970 .

2.

OWNER/S: As of December 3, 1973

per: Assessors X , Reg. of Deeds \_\_\_\_\_, Prev. Insp. \_\_\_\_\_, Per. Contact v .

1. Stevens Paper Mills, Incorporated, Windsor, Connecticut 06095  
Name St. & No. City/Town State Tel. No.

2. \_\_\_\_\_  
Name St. & No. City/Town State Tel. No.

3. \_\_\_\_\_  
Name St. & No. City/Town State Tel. No.

3A

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. Robert Ray, Plant Engineer,  
c/o Stevens Paper Mills, Incorporated, 77 Mill Street, Westfield, Ma. 01085 562-231  
Name St. & No. City/Town State Tel. No.

4.

## DATA:

No. of Pictures Taken None . Sketches See description of Dam.  
Plans, Where In offices of Stevens Paper Mills, Incorporated,  
77 Mill Street, Westfield, Ma. Plans for remodeling  
dam in 1957.

5.

## DEGREE OF HAZARD: (if dam should fail completely)\*

1. Minor \_\_\_\_\_ . 3. Severe \_\_\_\_\_ .

2. Moderate X . 4. Disastrous \_\_\_\_\_ .

Comments: Extensive development on flood plain easterly of junction of Little and Westfield Rivers could be effected.

\*This rating may change as land use changes (future development).

OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: 48" drawdown sluiceway - through bottom spillway wall  
9.5' from south abutment.

Controls Yes, TYPE: Sluice gate.

Automatic     . Manual X. Operative Yes     , No     . Unknown.

Comments: Sluice gate operated by hand stand on north abutment through a system  
of shafts and gears which activate a rack and pinion at gate.

All mechanism is under water. Information from company employee.

No. 2 Location and Type: 18" process water intake - near westerly end, north  
abutment.

Controls Yes, Type: 18" Gate operated from hand stand on abutment

Automatic     . Manual X. Operative Yes     , No X.

Comments: Operating shaft sheared off when operated in November, 1973. Pres  
operating devices removed for repairs - stop logs across inlet  
opening.

No. 3 Location and Type: 168' wide - 4.76' dropwall overflow spillway in main dam.

Controls None, Type:     

Automatic     . Manual     . Operative Yes     , No     .

Comments: Ice breakers on crest.

Drawdown present Yes X, No     . Operative Yes     , No     . Unknown - Has  
Comments: See No. 1 Above. been operated  
1957.

DAM UPSTREAM FACE: Approx. 1:1 on masonry spillway  
Slope 3:1 on embankment, Depth Water at Dam 6' to 7'

Material: Turf     . Brush & Trees     . Embankment     . Stone     . Spillway       
Rock fill. Masonry. Wood.

Other Approx. 350' of earth dike on northwesterly end of masonry  
spillway dam.

Condition: 1. Good     . 3. Major Repairs     .

2. Minor Repairs X. 4. Urgent Repairs     .

Comments: Some brush in riprap. Stone masonry under water.

3. DAM DOWNSTREAM FACE: Spillway structure. Vertical embankment  
Slope 3:1

Material: Turf X. Brush & Trees     . Rock Fill     . Stone     . Spillway       
Masonry. X. Wood.

Other Concrete cap on crest. Stone masonry wall appeared  
sound.

Condition: 1. Good X. 3. Major Repairs     .

2. Minor Repairs     . 4. Urgent Repairs     .

Comments:

9. EMERGENCY SPILLWAY: Available Yes. Needed       .

Height Above Normal Water 4.76 Ft. Above crest spillway.

Width 191.32 Ft. Height 10.4 Ft. Material Masonry.

Condition: 1. Good X. 3. Major Repairs       .

2. Minor Repairs       . 4. Urgent Repairs       .

Comments: Additional capacity spillway from crest of original dam at  
EL. 164.56 to top of northwesterly abutment and embankment.

10. WATER LEVEL AT TIME OF INSPECTION: 1/4 Ft. Above X. Below       .

Top Dam        F.L. Principal Spillway X.

Other       .

Normal Freeboard 15.2 Ft. from spillway crest to top of northwesterly abutment.

11. SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment Minor brush growth in riprap - upstream  
embankment slope.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam Very minor wear of abutment wall at spillway crest

Cracked or Damaged Masonry None noted. Water overtopping spillway masonry

Evidence of Seepage None found

Evidence of Piping None found

Leaks None found

Erosion None noted

Trash and/or Debris Impeding Flow One tree trunk caught on crest spillway

Clogged or Blocked Spillway No

Other Drawdown gate has not been opened since 1957 and inlet of drawdown could  
be covered by silt. Water at abutment 6' to 7' deep. Flow line drawdown  
10' below crest. Gate operating mechanism for 18" gate for processing  
water 18" pipe to Mill broken November, 1973. Removed at time of  
inspection for repairs.

(12.)

## OVERALL CONDITION:

1. Safe\_\_\_\_\_.
2. Minor repairs needed X\_\_\_\_\_.
3. Conditionally safe - major repairs needed\_\_\_\_\_.
4. Unsafe\_\_\_\_\_.
5. Reservoir impoundment no longer exists (explain)  
Recommend removal from inspection list\_\_\_\_\_.

(13.)

## REMARKS AND RECOMMENDATIONS: (Fully Explain)

This is an old stone masonry spillway dam extensively rebuilt and remodeled in 1957 at which time the crest elevation of the spillway was lowered from elevation 164.56 to elevation 159.20 and a concrete cap installed on the crest. At the same time the northwesterly abutment was remodeled and the dike at the northeasterly side of the river was rebuilt.

At the time of the inspection water was flowing over the spillway about 3 to 4 in deep preventing a close examination of the spillway's toe face wall and crest. Portions of the masonry which could be seen appeared to be in satisfactory condition. There was slight wear in the northwest abutment wall where it found the spillway crest and some of the joints in the stone masonry southeasterly abutment were deteriorating.

The downstream end of a 48 inch boiler plate drawdown conduit could be seen from shore. Its flow line was about 10 feet below the spillway crest. On the upstream end, the inlet and gate work are very likely to be covered with silt, as sounding at the abutment showed only 6 to 7 feet of water. The control gate for the drawdown is operated by a rack and pinion device operated from a hand stand on the abutment by means of a system of gears and shafts. Except for the hand stand all the gate operating mechanism is underwater and silt and its condition was not evaluated. Mr. Ray the Plant Engineer said that the drawdown had not been opened since 1957.

There is a rectangular niche in the northeasterly abutment which houses the gate for a 18" pipe feeding processing water to the Paper Mill. There are provisions for stop logs across this niche. At the time of this inspection the operating mechanism for the gate had been removed for repairs according to the Plant Engineer.

13. REMARKS AND RECOMMENDATIONS (Continued)

The earth dike extending north, northwesterly from the end of the spillway was in satisfactory condition with a good growth of turf on its top and downstream slope. There were several small clumps of brush growing in the riprap on the downstream slope which could be removed. Two power poles on the dike do not effect the condition of the dike to any extent.

This dam appears to be in satisfactory condition. The inoperative gate for the intake pipe is being repaired and the only items which may require attention in the future are removal of the brush growing in the riprap and determining if the drawdown gate is functionable.

RCS/sd

DISTRICT II.Submitted by Russell C. Salls, P. E. Dam No. 2-7-329-5Date December 3 and 10, 1973 City/~~State~~ WestfieldName of Dam Stevens Paper Co. - Lower DamSee also Dam Number 2-7-329-6Location: Topo Sheet No. 9D Mass. Rect. Coordinates N 407.500 E 256.300Provide  $8\frac{1}{2}$ " x 11" in clear copy of topo map with location of Dam clearly indicated.On Little River just west 500' of Routes 202 and 10, College Highway Bridge  
and 500' south of Jct. Mill Street and Crane Road.2. Year built Unknown Year/s of subsequent repairs Remodeled in 19553. Purpose of Dam: Water Supply For Paper Mill Recreational \_\_\_\_\_  
Flood Control \_\_\_\_\_ Irrigation \_\_\_\_\_ Other Also used formerly  
as power source.4. Drainage Area: \_\_\_\_\_ 48 sq. mi. \_\_\_\_\_ acres.  
Type: City, Bus. & Ind. \_\_\_\_\_ Dense Res. \_\_\_\_\_ Suburban \_\_\_\_\_ Rural, Farm 10%  
Wood & Scrub Land 90% Slope: Steep 20% Med. 60% Slight 20%5. Normal Ponding Area: \_\_\_\_\_ 53 Acres; Ave. Depth 4'  
Impoundment: 69.8 Million gals.; \_\_\_\_\_ 212 acre ft.  
Silted in: Yes X No \_\_\_\_\_ Approx. Amount Storage Area  $\frac{1}{2}$ 6. No. and type of dwellings located adjacent to pond or reservoir \_\_\_\_\_  
i.e. summer homes etc. 6 - 7 Residences overlook pond.7. Dimensions of Dam: Length 191.3' Max. Height 13'±  
Freeboard 15.2'  
Slopes: Upstream Face 1:1 Masonry spillway wall - 3:1 Embankment  
Downstream Face Vertical masonry spillway wall - 3:1 Embankment  
Width across top 8' - 11" Concrete spillway crest  
5' - 20' Earth dike  
Also 360'± of earth dike on southeast bank.

Dam No. 2-7-329-5

8.

Classification of Dam by Material:

Earth Dike Conc. Masonry Cap Stone Masonry Wall  
Timber \_\_\_\_\_ Rockfill \_\_\_\_\_ Other \_\_\_\_\_

8A.

Dam Type: Gravity X Straight X Curved, Arched \_\_\_\_\_ Other \_\_\_\_\_  
Overflow X Non-overflow \_\_\_\_\_

9.

A. Description of present land usage downstream of dam:

80 % rural; 20 % ~~rural~~ developed

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes X No \_\_\_\_\_

C. Character Downstream Valley: Narrow \_\_\_\_\_ Wide X Developed 20%  
Rural 80% Urban \_\_\_\_\_

Flood plains have extensive industrial and commercial development.

10.

Risk to life and property in event of complete failure.

No. of people 4

No. of homes 4

No. of businesses 5 to 6

No. of industries 5 to 6 Type General manufacturing

No. of utilities 4 Type Sewer Lines, Water Lines, Electrical and Transmission Lines and Telephone

Railroads Not active.

Other dams On Little River only Brush Dam breached.

Increasing development of flood plain areas below dam. Westfield R  
Other in flood stage backs up Little River so flood plain is flooded before flood crest of Little River reaches area.

11.

Attach Sketch of dam to this form showing section and plan on 8 $\frac{1}{2}$ " x 11" sheet.

RCS/vk/sd

Attachments

Locas Plan

Sketches



22.33' 31.0'

1-4

940'

1-4

40.0

4 - Spacing of 10' of 3 ice breakers

Bottom edge of new conc. cap

(CONC. 11.159.00)

ICE BREAKER

Face of Dam

ICE AREA

CONTRACTING JOURNAL

PLAN  
ATTOR SCALE 1" = 20'-0"

THIS PORTION OF  
ORIGINAL DAM LEFT  
IN PLACE 1932  
REMAINING EXCAVATED &  
BACK FILLED WITH CONC.

THIS PORTION OF  
ORIGINAL DAM LEFT  
IN PLACE 1932

RECEIVED FROM 10-15-17

11/139.80-2

CONCRETE CAP 1932

OLD STONE DAM

DAM

11.159.00

HAND STAND TO CONTROL  
INTAKE GATE FOR 18"  
INTAKE PIPE

✓ INTAKE 2.12.74  
13" DIAM

1. SAZ 2014  
2. SAZ 2014  
3. SAZ 2014  
4. SAZ 2014  
5. SAZ 2014  
6. SAZ 2014  
7. SAZ 2014  
8. SAZ 2014  
9. SAZ 2014  
10. SAZ 2014  
11. SAZ 2014  
12. SAZ 2014  
13. SAZ 2014  
14. SAZ 2014  
15. SAZ 2014  
16. SAZ 2014  
17. SAZ 2014  
18. SAZ 2014  
19. SAZ 2014  
20. SAZ 2014  
21. SAZ 2014  
22. SAZ 2014  
23. SAZ 2014  
24. SAZ 2014  
25. SAZ 2014  
26. SAZ 2014  
27. SAZ 2014  
28. SAZ 2014  
29. SAZ 2014  
30. SAZ 2014  
31. SAZ 2014  
32. SAZ 2014  
33. SAZ 2014  
34. SAZ 2014  
35. SAZ 2014  
36. SAZ 2014  
37. SAZ 2014  
38. SAZ 2014  
39. SAZ 2014  
40. SAZ 2014  
41. SAZ 2014  
42. SAZ 2014  
43. SAZ 2014  
44. SAZ 2014  
45. SAZ 2014  
46. SAZ 2014  
47. SAZ 2014  
48. SAZ 2014  
49. SAZ 2014  
50. SAZ 2014  
51. SAZ 2014  
52. SAZ 2014  
53. SAZ 2014  
54. SAZ 2014  
55. SAZ 2014  
56. SAZ 2014  
57. SAZ 2014  
58. SAZ 2014  
59. SAZ 2014  
60. SAZ 2014  
61. SAZ 2014  
62. SAZ 2014  
63. SAZ 2014  
64. SAZ 2014  
65. SAZ 2014  
66. SAZ 2014  
67. SAZ 2014  
68. SAZ 2014  
69. SAZ 2014  
70. SAZ 2014  
71. SAZ 2014  
72. SAZ 2014  
73. SAZ 2014  
74. SAZ 2014  
75. SAZ 2014  
76. SAZ 2014  
77. SAZ 2014  
78. SAZ 2014  
79. SAZ 2014  
80. SAZ 2014  
81. SAZ 2014  
82. SAZ 2014  
83. SAZ 2014  
84. SAZ 2014  
85. SAZ 2014  
86. SAZ 2014  
87. SAZ 2014  
88. SAZ 2014  
89. SAZ 2014  
90. SAZ 2014  
91. SAZ 2014  
92. SAZ 2014  
93. SAZ 2014  
94. SAZ 2014  
95. SAZ 2014  
96. SAZ 2014  
97. SAZ 2014  
98. SAZ 2014  
99. SAZ 2014  
100. SAZ 2014

Top Secret - R  
E-100

NORMAL WATER  
LEVEL  $\searrow$  EL 159.89

13" PIPE EL 154.05

EL 155.13

NEW ADVERTIMENT

— ۱۵۸ —

OLD ALUMINUM

5.34

ELEV CREST 157.50

## REFERENCE

2CINE  
CONE CAP

1-2-8-11

STONE MASONRY  
DAM

X SECTION AA

13-11<sup>2</sup>

4 5'-11" - 2'-11" =

EL 159.80

WATER LEVEL

SLUICE  
GATE -

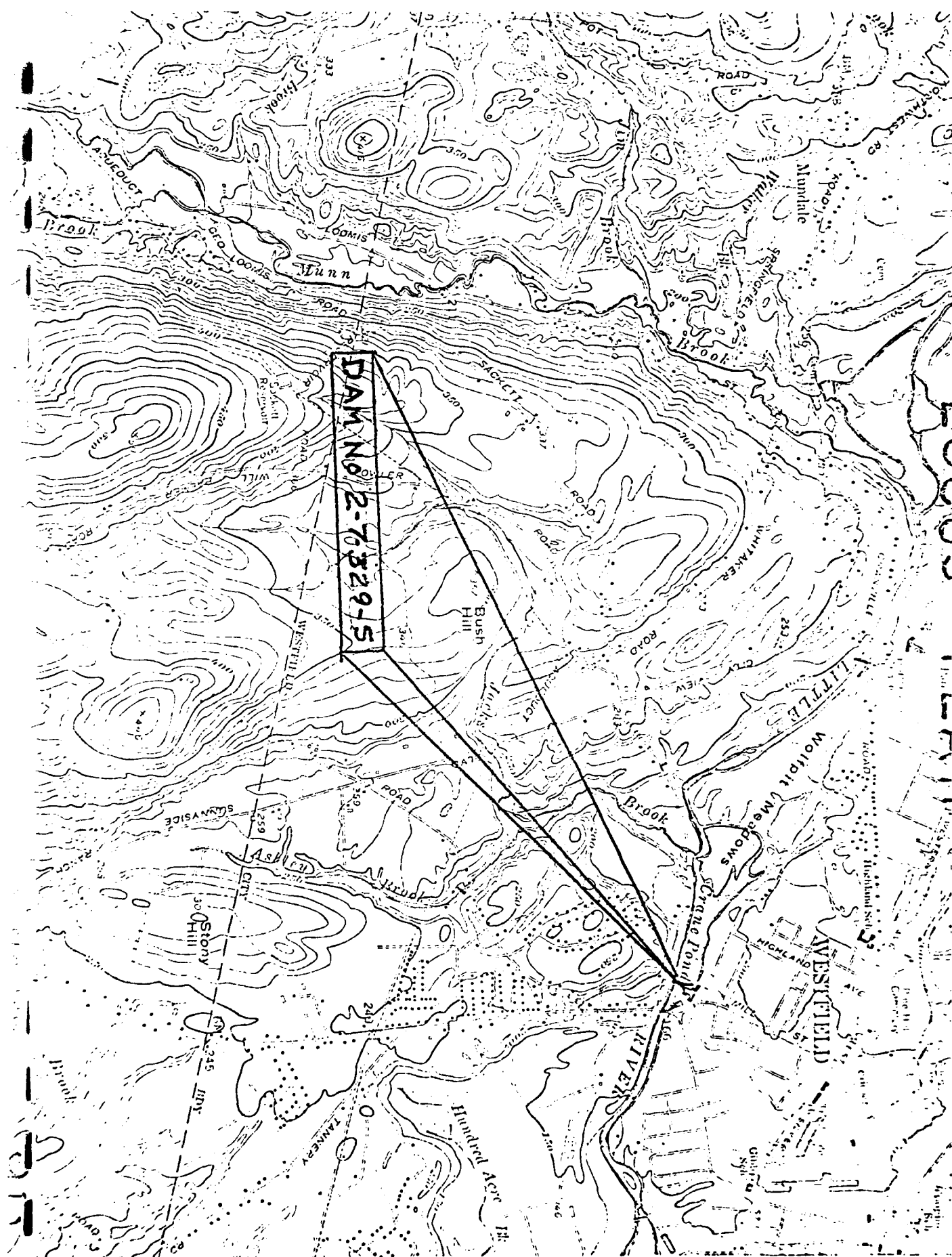
REINF  
CONC CAP

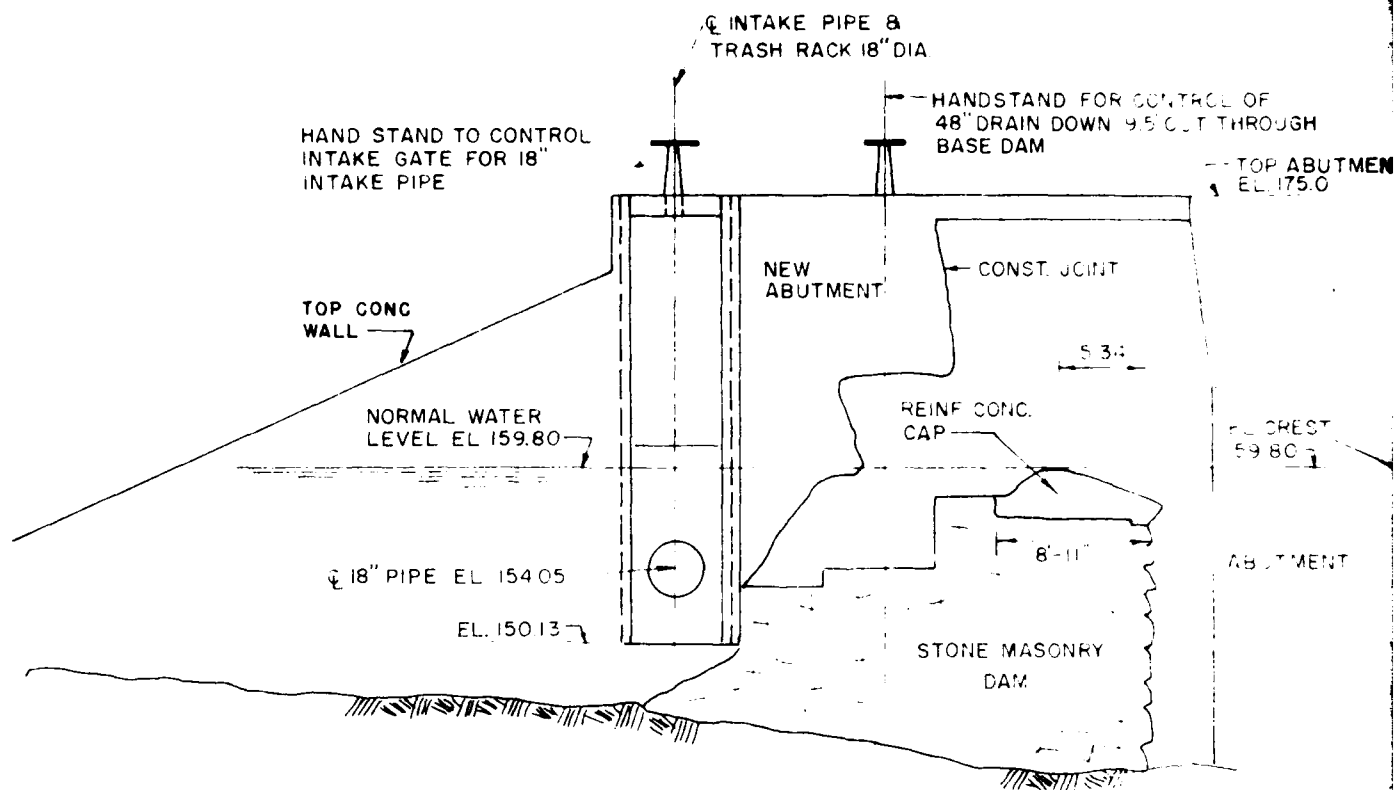
STONE MESSY

48" O.D. Pipe

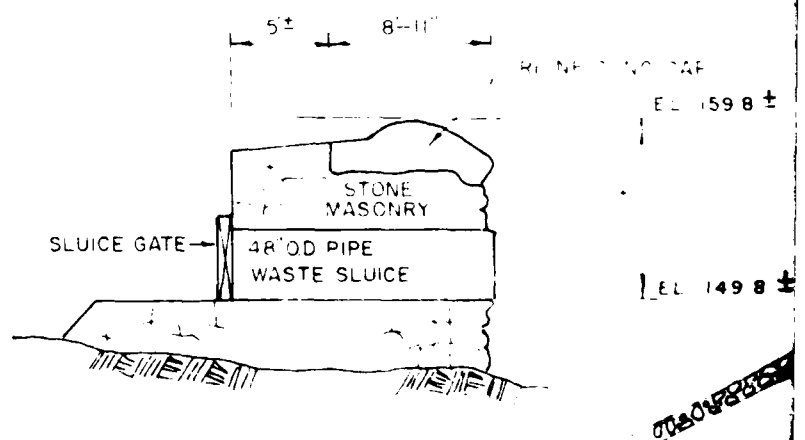
WASH SL 202

X SECTION BE





SECTION A-A



SECTION B-B

STAND FOR CONTROL OF  
RAIN DOWN 9.5' OUT THROUGH  
DAM

TOP ABUTMENT  
EL. 175.0

CONST. JOINT

5.34

CONC.

EL. CREST  
159.80

ABUTMENT

MASONRY  
DAM

23.33'

168

CR

ICE BREAKERS

CONTRACTION JOINT

LITTLE  
RIVER

PLAN OF SPILL

THIS PORTION OF ORIGINAL  
DAM LEFT IN PLACE

EL. OF CREST PRIOR TO 1955 164.56'

ORI  
EL

OLD STONE MA

REINFC CONC CAP

EL 159.8 ±

11"

RY

E

E

E

E

E

E

E

E

E

E

E

E

E

E

2' RIP-RAP

EL 149.8 ±

2

CONC RETAINING WALL

DRAINAGE DITCH  
ROADWAY

ELEVATION 0

ZONE "A"  
FILL

ZONE "B" FILL

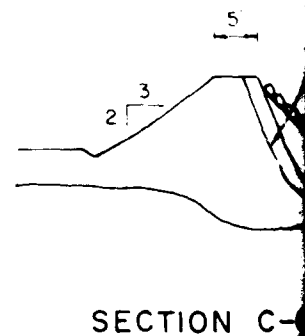
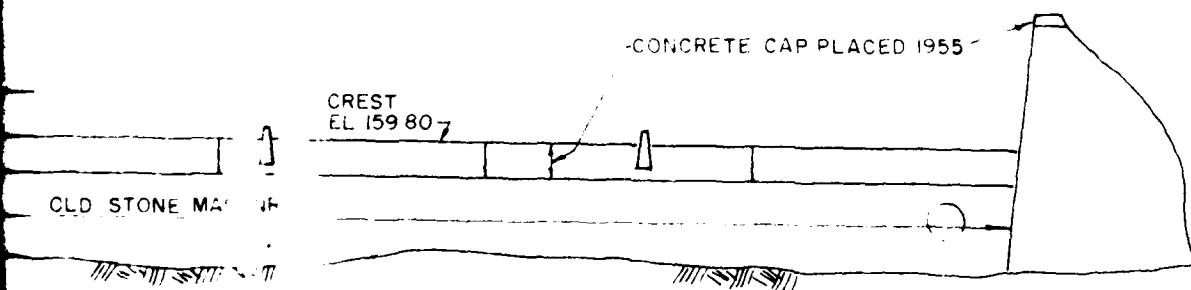
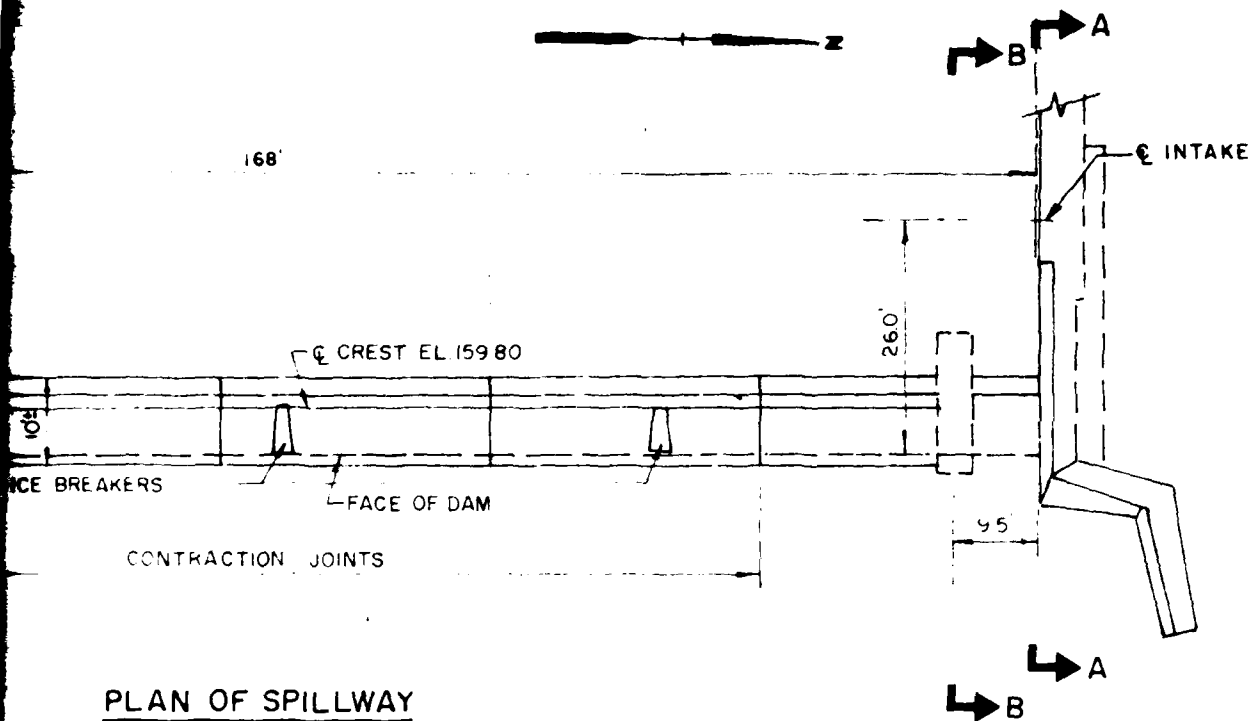
STEEL SHEETING

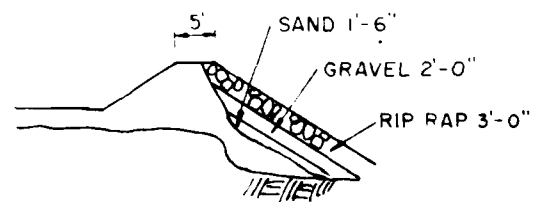
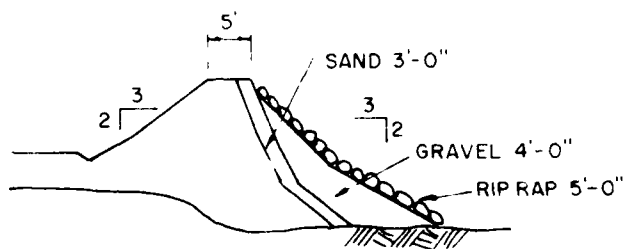
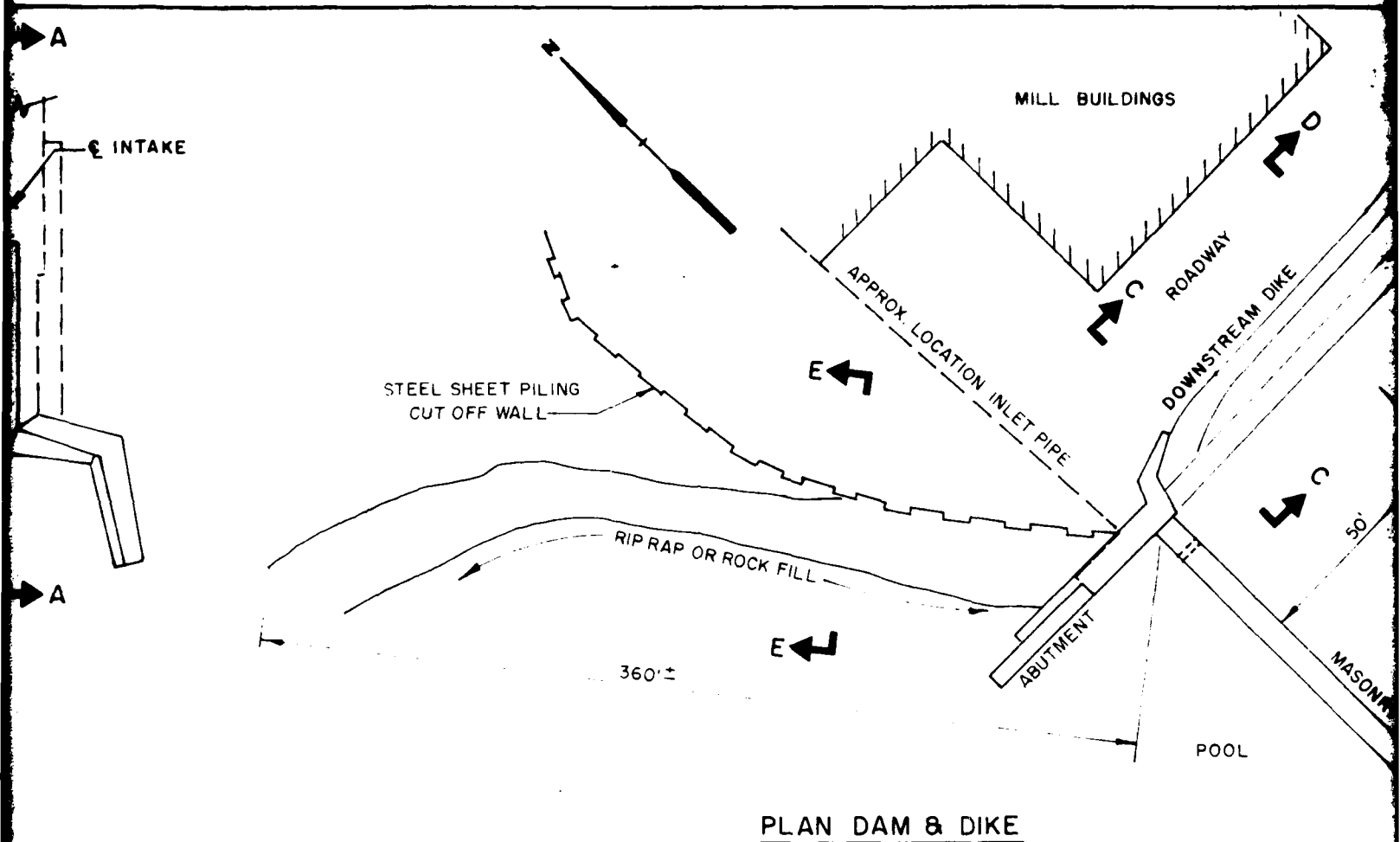
LEDGE

SECTION E-E

B-B

2





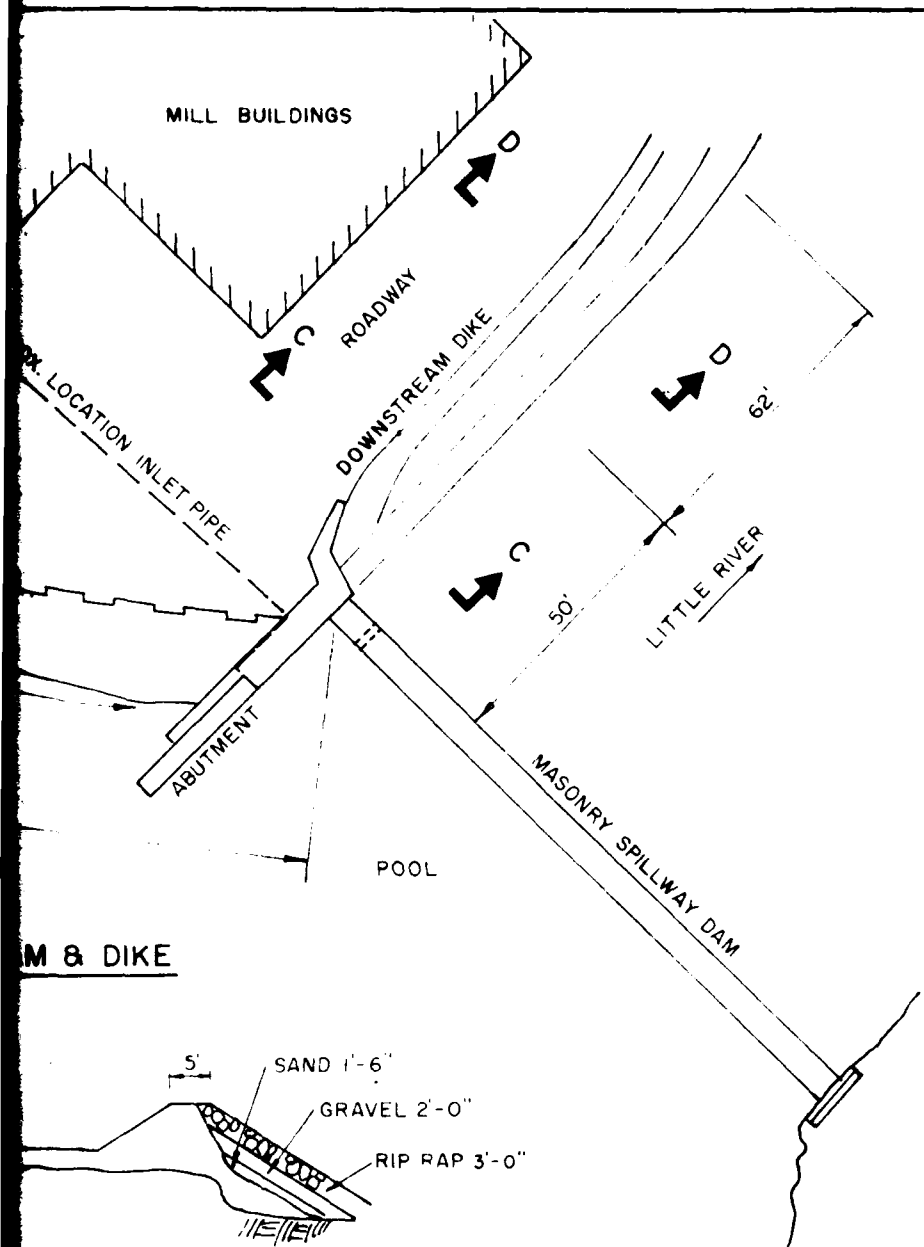
SECTION C-C

SECTION D-D

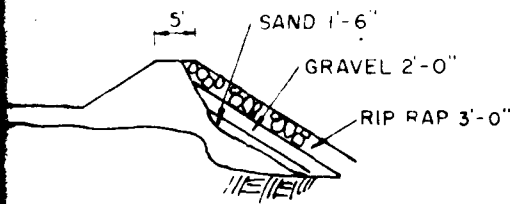
4

TAKEN FROM: STONE & WEBSTER  
ENGINEERING CORPORATION 1955  
DESIGN PLAN AND STATE 1973  
INSPECTION REPORT SKETCHES

HAYDEN, HARDING & BUCHANAN, INC.		U.S. ARMY
CONSULTING ENGINEERS		
BOSTON, MASSACHUSETTS		
NATIONAL PROGRAM OF INSPECTION		
STEVENS PAPER		
WESTFIELD		
		SCALE
		DATE



**M & DIKE**

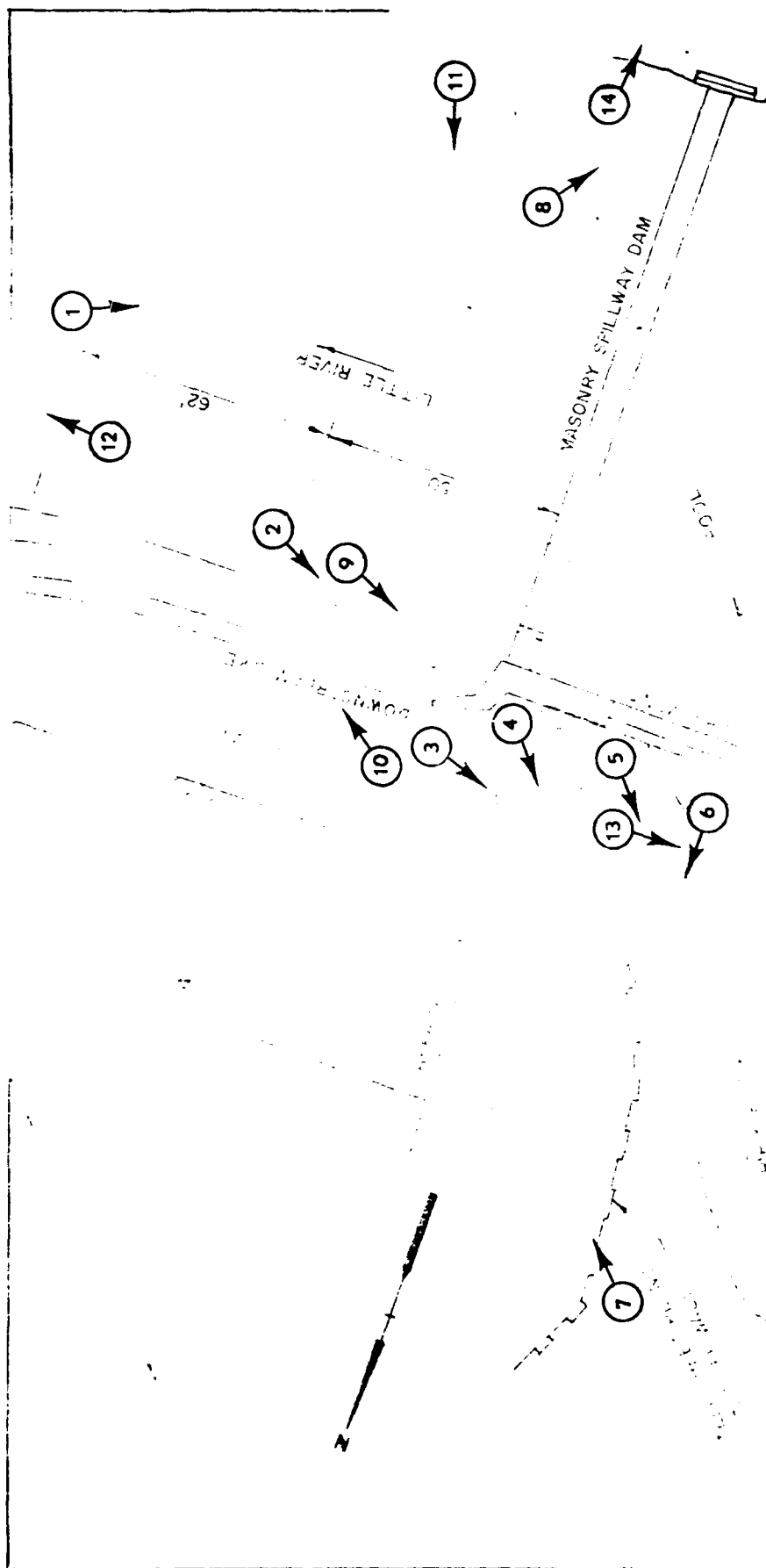


**SECTION D-D**

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
STEVENS PAPER COMPANY	
WESTFIELD MASSACHUSETTS	
	SCALE NOT TO SCALE
	DATE FEBRUARY, 1979

5

APPENDIX C  
PHOTOGRAPHS



PLAN

U.S. ARMY ENGINEERS, NEW ENGLAND DISTRICT  
CORPS OF ENGINEERS  
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOCATION OF PHOTOGRAPHS  
STEVENS PAPER COMPANY

MASSACHUSETTS

DATE OF PHOTOGRAPH, 1979



PHOTO NO. 1 - Downstream face of spillway section.



PHOTO NO. 2 - Left training wall of spillway.



PHOTO NO. 3 - Downstream face of embankment section from spillway towards left abutment.



PHOTO NO. 4 - Crest of embankment viewed from spillway training wall toward left abutment.

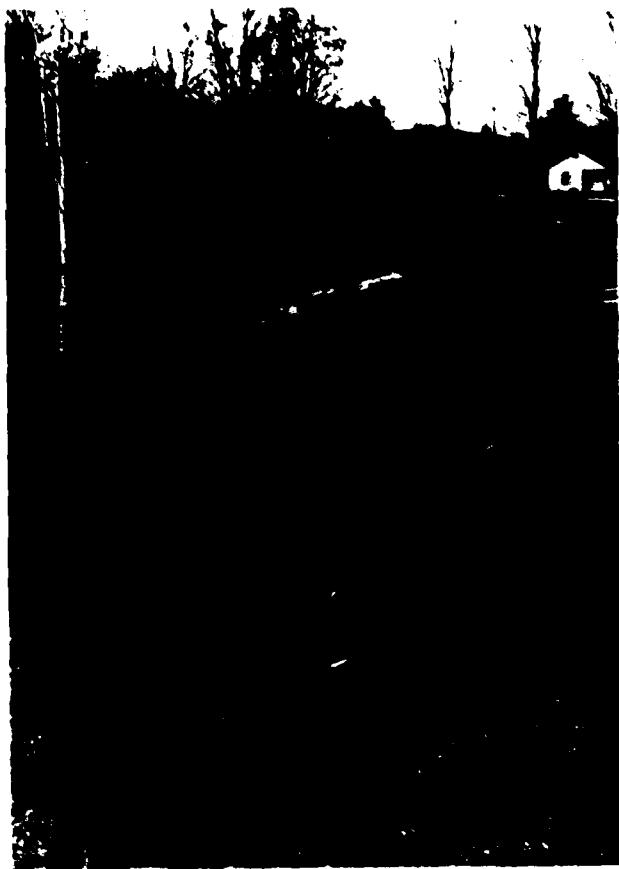


PHOTO NO. 5 - Upstream face of embankment viewed from spillway training wall toward left abutment.



PHOTO NO. 6 - Upstream face of embankment viewed from a point about 200 feet from spillway training wall toward the left abutment.



PHOTO NO. 7 - Downstream toe of embankment section.



PHOTO NO. 8 - Downstream face of spillway section and right training wall of spillway. Note bedrock outcrop at right end of spillway.



PHOTO NO. 9 - Left training wall of spillway viewed from  
bank of river channel downstream of spillway.



PHOTO NO. 10 - Downstream channel.



PHOTO NO. 11 - Left spillway abutment and mill complex.



PHOTO NO. 12 - Downstream channel from bridge shown in photo no. 10.



PHOTO NO. 13 - Upstream channel.



PHOTO NO. 14 - Erosion of downstream retaining wall at right abutment of spillway.

APPENDIX D  
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

78,941  
12-28-75  
1.1A  
BY FDD 112179



HAYDEN, HARDING & BUCHANAN, INC.  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

SHEET NO. 10f  
JOB Dams  
SUBJECT Stevens  
CLIENT Corps  
"Little River"

Dam rebuilt 1957 to replace earlier dam damaged by 1955 Flood. Calculations by Stone & Webster show peak flow Aug. 1955 = 23,100 cfs. New dam designed for 34,000 cfs @ Elev. 172.4 - see stage discharge diagrams. No other cates were located.

Hydraulic height  $\approx 25'$

Normal Storage  $\approx 210$  a-f

Max. Storage  $\approx 800$  a-f

Size Classification = Intermediate

Hazard Potential = High (Initial Assumption - lowered Pg 4

Test Ad = 1/2 PMF (max. known flood of 23,100 cfs Aug. 19, 1955 storm of record)

Test Fld =  $125' \times 38.4 = 48,000$  cfs (PMF on lower drainage area)

Drainage Area above Cobble Mtn. However -

not included (additional 45.8 sq. mi.) as

Reservoir Level is below Spillway Elev. for normal operation.

With this area considered:

Test Fld =  $1000 \times 84.2 = 84,200$  cfs

Neither case accounts for influence of other reservoirs & dams on storm runoff.

Since Aug 1955 Flood flow = 23,100 cfs and design for 1957 for 34,000 cfs, verify 34,000 cfs and 1/2 PMF of 42,100 cfs. (Not very different from PMF over 38.4 sq. mi. = 48,000 cfs).

USGS Circular 377 & WSP 1420 Aug 19, 1955

flood 21,700 cfs at dam - calculated. Drainage area 77.7 sq. mi., "no flow" from Cobble Mtn.

FLU

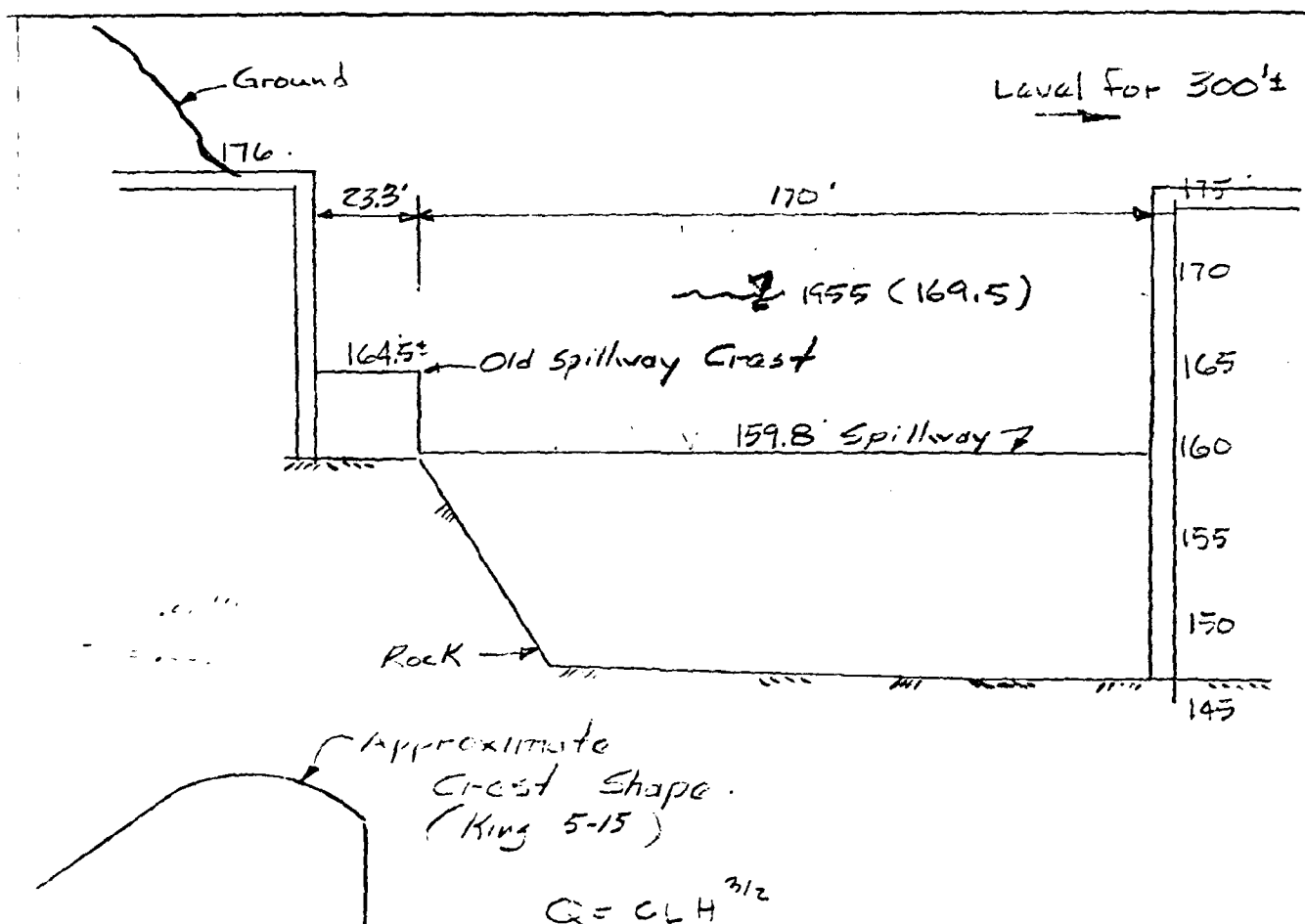


HAYDEN, HAKUNG & BUCHANAN, INC  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

JOB Udms

SUBJECT *Stearns*

CLIENT Corps



$$Q = C_L H^{3/2}$$

<u>L</u>	<u>L</u>	<u>C</u>	<u>H</u>	<u>H<sup>3/2</sup></u>	<u>Q<sub>cs</sub></u>	<u>D'</u>	<u>L'</u>	<u>C'</u>	<u>H<sup>3/2</sup></u>	<u>Q'</u>	<u>Q<sub>1</sub></u>
1	170'	3.28	1.0	1	558.	\					558
2	"	3.32	2.0	2.83	1597.	\					1597
3	"	3.46	3.0	5.2	3059.	\					3059
4	"	3.59	4.0	8.	4882.	\					4882
4.5	170	3.62	4.5	9.55	5877.	0'	23.3	-	-	0	5877
5	170	3.65	5	11.18	6937.	0.5	"	3.28	35	27.	6969
8	"	"	-	-	-	-	-	-	-	-	-
10	"	"	10	31.62	19620.	5.5	"	3.65	12.9	1097.	20717
12	"	"	-	-	-	-	-	-	-	-	-
15	170	"	15	58.09	36045.	10.5	"	3.65	34.02	2894.	38938

<u>L</u>	<u>A</u>	<u>WP</u>	<u>R<sup>2/3</sup></u>	<u><math>\frac{148.6}{10.49} = 60.57</math></u>	<u>Q</u>
1	441.3	330'	1.31	4.2	2712.
15	750	345	1.68	"	5300.

} Flow over top of dam.

NO. 10.647.1  
 12/28/78  
 MA  
 FDD



HAYDEN, HARDING & BUCHANAN, INC.  
 CONSULTING ENGINEERS  
 BOSTON, MASSACHUSETTS

SHEET NO. 2

JOB Dams  
 SUBJECT Stevens  
 CLIENT Corps

Spillway between elev 160 and 175 has maximum capacity of about 39,000 cfs. This will be adequate for 23,100 cfs max. Known Flood and 34,000 cfs design flood. The 112 PMF of 42100 cfs will over-top the dam by about 1 foot to elev. 176±. A more detailed study may indicate that the 112 PMF passes the spillway w/o over-topping the dam.

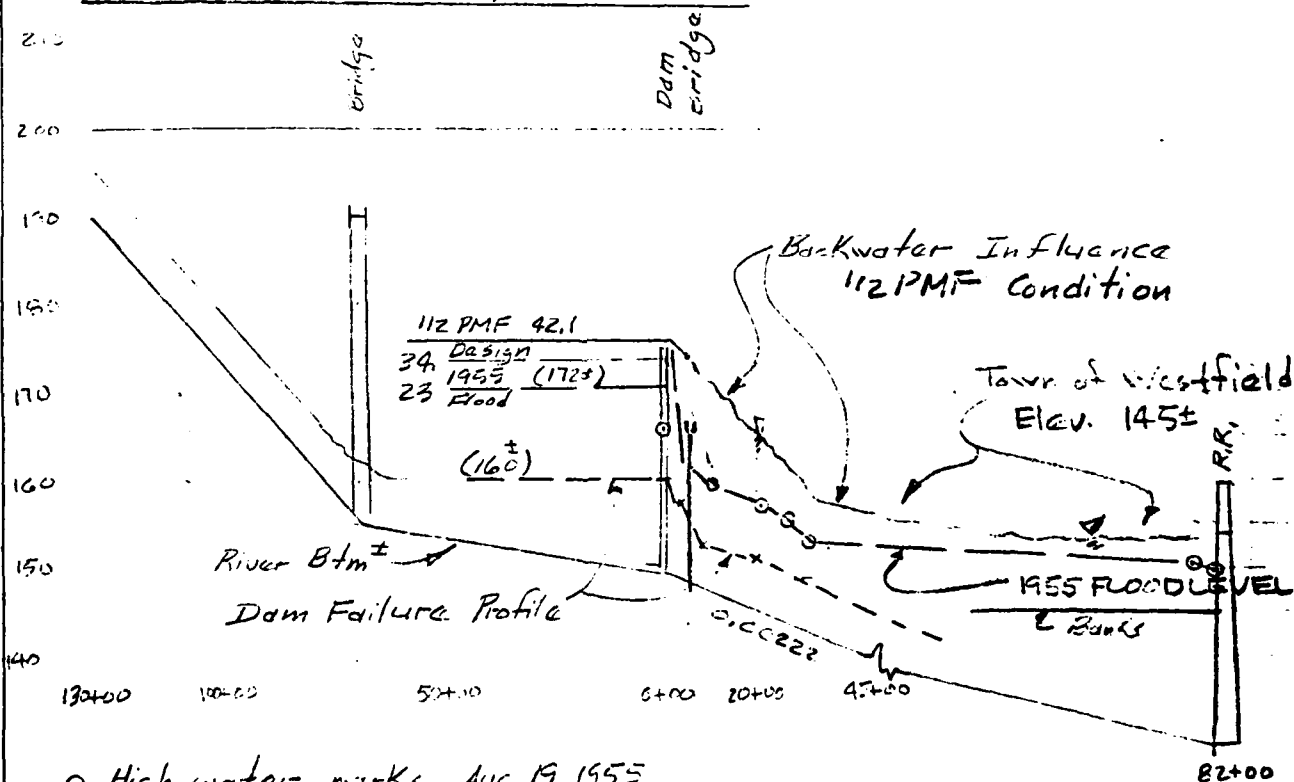
$$Q_{P1} = 42100 \text{ cfs} \quad \text{stor} = 1456 \text{ a-ft or } 0.4'' \text{ runoff}$$

$$Q_{P2} = 42100 \left(1 - \frac{0.4}{9.5}\right) = 40322 \text{ cfs} \quad E_{1/2} = 175.25$$

$$Q_{P3} = 42100 (1 - .39/9.5) = 40372 \quad \text{stor}_2 = 0.38$$

Since  $\text{stor} \approx 0.4''$ ,  $Q_{P1} \approx Q_{P2}$  for practical purposes.

### Flood Profiles - Various Flows



- High water marks Aug 19, 1955  
 USGS WSP 1420 Peak Flow  
 at dam 21,700 cfs calculated.

--x-- dam failure profile

78224.1

12-28-78

M-1

FCC



HAYDEN, HARDING & BUCHANAN, INC.  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

SHEET NO. 4

JOB Dams

SUBJECT Stevens

CLIENT Corps

### Dam Failure

with water at top of dam elev 175 to 176

$$Q_F = 8.47 \times (76) \times \sqrt{32.2} \times (31)^{1.5} = 22100 \text{ cfs}$$

at this level there is major flooding d.s. due to flood flow - dam failure will not be significant as flow from normal spillage is 40,000 cfs ±

Assuming water level at elev. 160 ±, top of spillway the failure flow is

$$Q_F = 8.47 \times (76) \times \sqrt{32.2} \times (15)^{1.5} = 7424 \text{ cfs}$$

Since there is no spillage to cause d.s. flooding, at elev 160 ±, this flow is significant. The capacity of the river channel to dissipate the failure flow should confine flooding to w/in river channel and certain low flood plain areas - damage to homes and loss of life is not evident. Hazard potential from dam failure is low. Test flood would become 100 yr to 1/2 pmf. Ability of dam to store storm runoff is very small therefore,  $Q$  in  $\approx$   $Q_{out}$  for practical purposes.

JOB NO. \_\_\_\_\_  
 DATE 12/29/78  
 BY MA  
 CHECKED BY FDD

**H&B** HAYDEN, HARDING & BUCHANAN, INC.  
 CONSULTING ENGINEERS  
 BOSTON, MASSACHUSETTS

DRAWING NO. \_\_\_\_\_  
 JOB Dams  
 SUBJECT Stavans  
 CLIENT Corps

Sta 5+00 (downstream)

$$S = 0.00222''$$

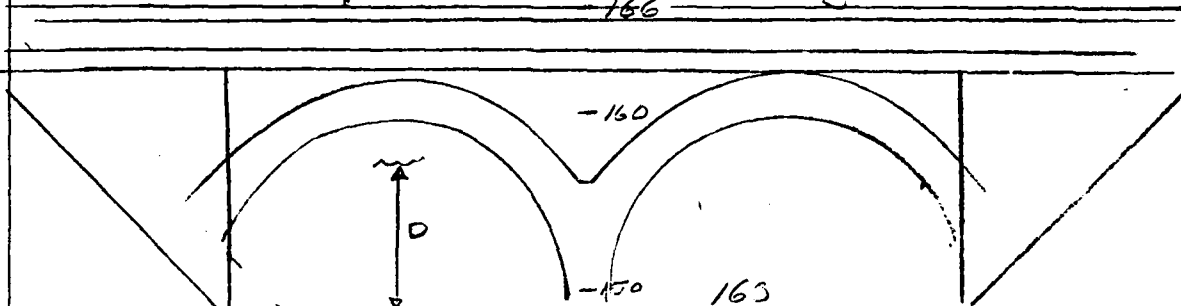
$$n = 0.03 \text{ River}$$

$$0.05 \text{ at bridge}$$

$$K = \frac{1.486}{.03} (.00222)^{1/2} = 2.33$$

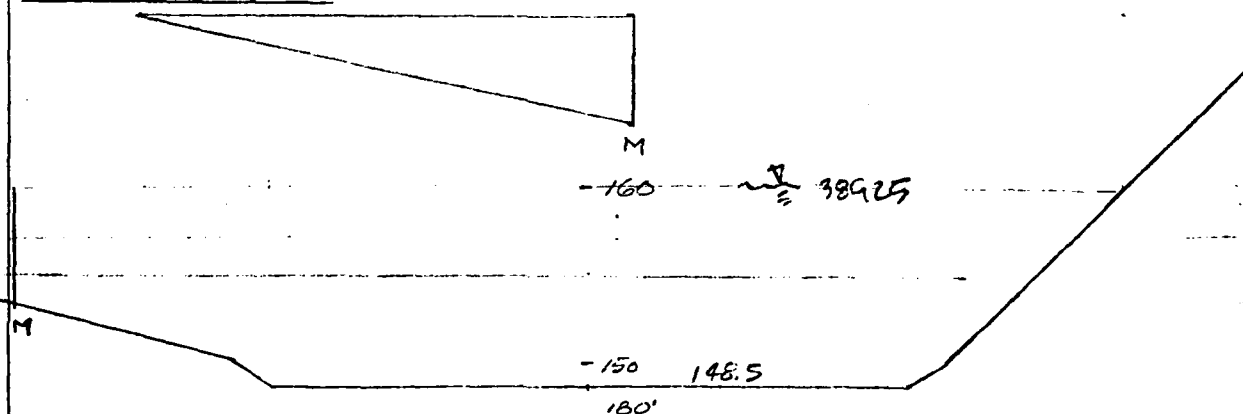
↑ "D"

Bridge Obstruction



D	A	WP	R <sup>2/3</sup>	K	V	Q	QT
11	1760	182	4.6	2.33	10.7	19000	19000
12	1920	184	4.8	2.33	11.19	21500	21500 ✓
"4"	2800 ±	700 ±	2.53	1.4	3.54	10,000	31500
"9"	6000 ±	800 ±	3.86	1.4	5.4	32400	54,000
5	800	170	2.8	2.33	6.6	5300	5300

Sta 7+00 d.s. elev. 148.5 ±



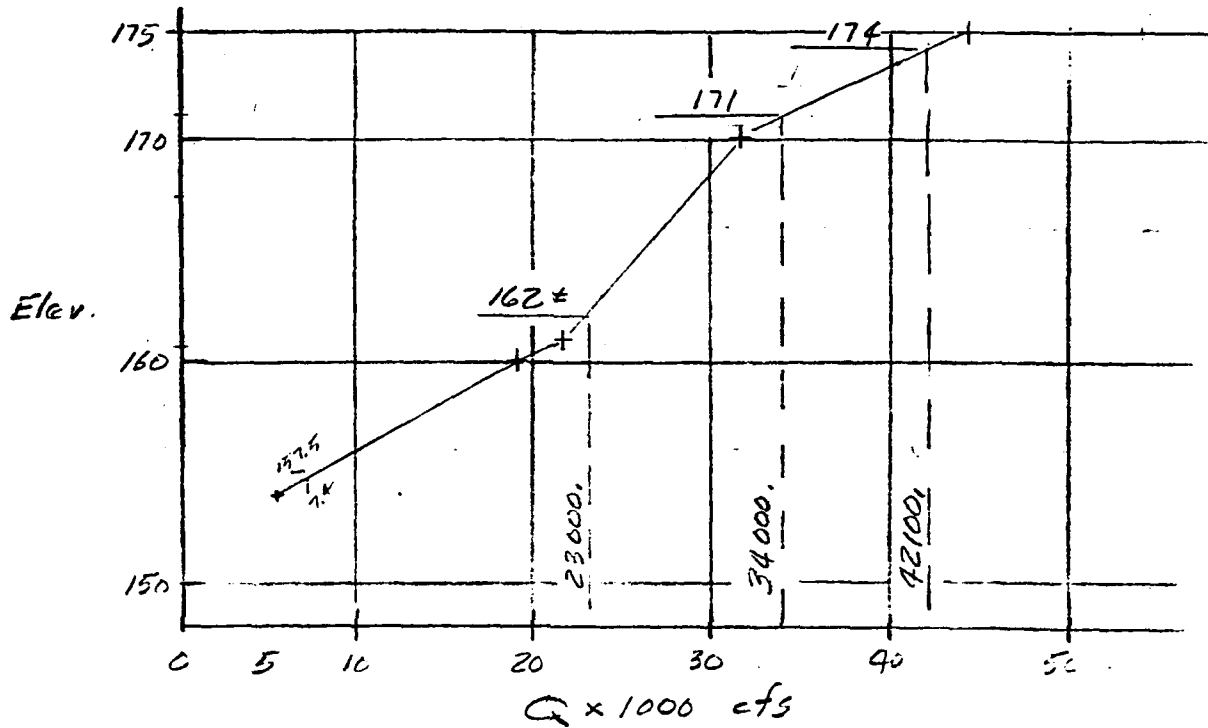
D	A	WP	R <sup>2/3</sup>	K	V	Q	Elev
11.5	4145	500	4.13	2.28	9.4	39,000	160 39925
12.5	4600	525	4.28	"	9.8	44,900	161
7.5	1840	340	3.1	"	7.07	13,000	
9.5	2520	400	3.43	"	7.83	19,700	

DATE 12/29/78  
 BY MA  
 CH'D BY FDD

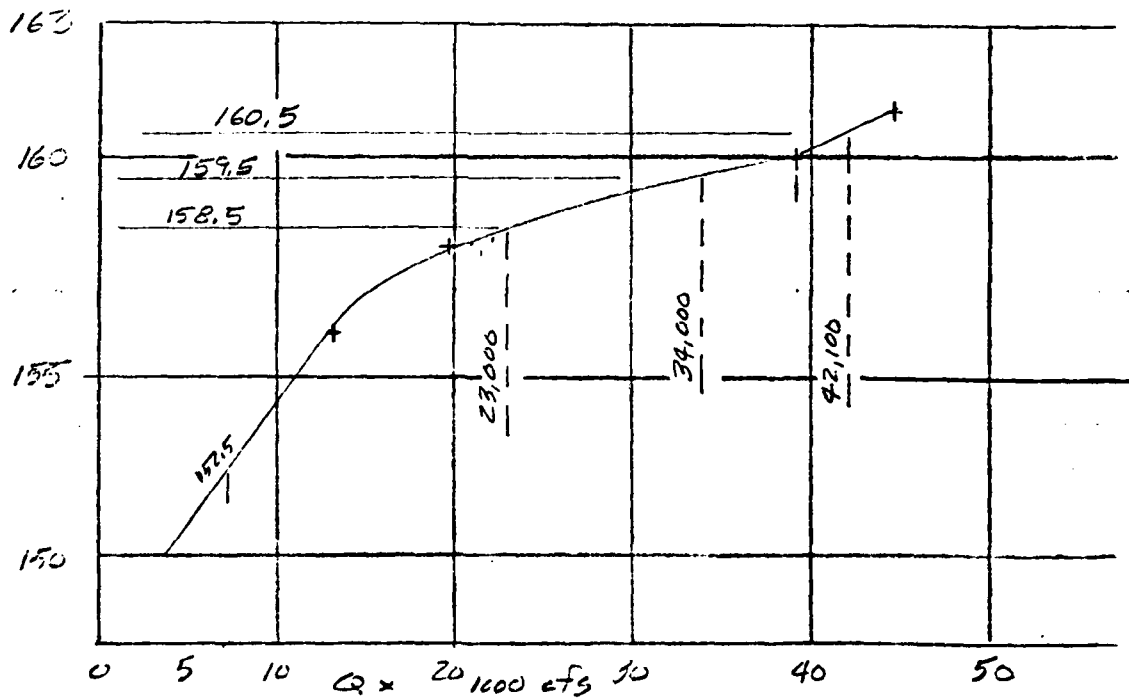
**H&B** HAYDEN, HARDING & BUCHANAN, INC.  
 CONSULTING ENGINEERS  
 BOSTON, MASSACHUSETTS

JOB Dams  
 SUBJECT Stations  
 CLIENT Corps

Sta 5+00 d.s. (bridge)



Sta. 7+00 d.s.



NO 78.244.1  
 12/15/51  
 MA  
 FDD

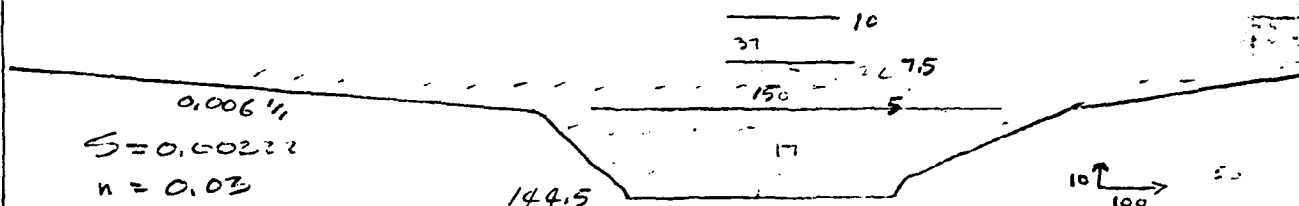


HAYDEN, HARDING & BUCHANAN, INC.  
 CONSULTING ENGINEERS  
 BOSTON, MASSACHUSETTS

SHEET NO. 7  
 JOB Dams  
 SUBJECT Stevens  
 CLIENT Corps

Sta 20+00 d.s.

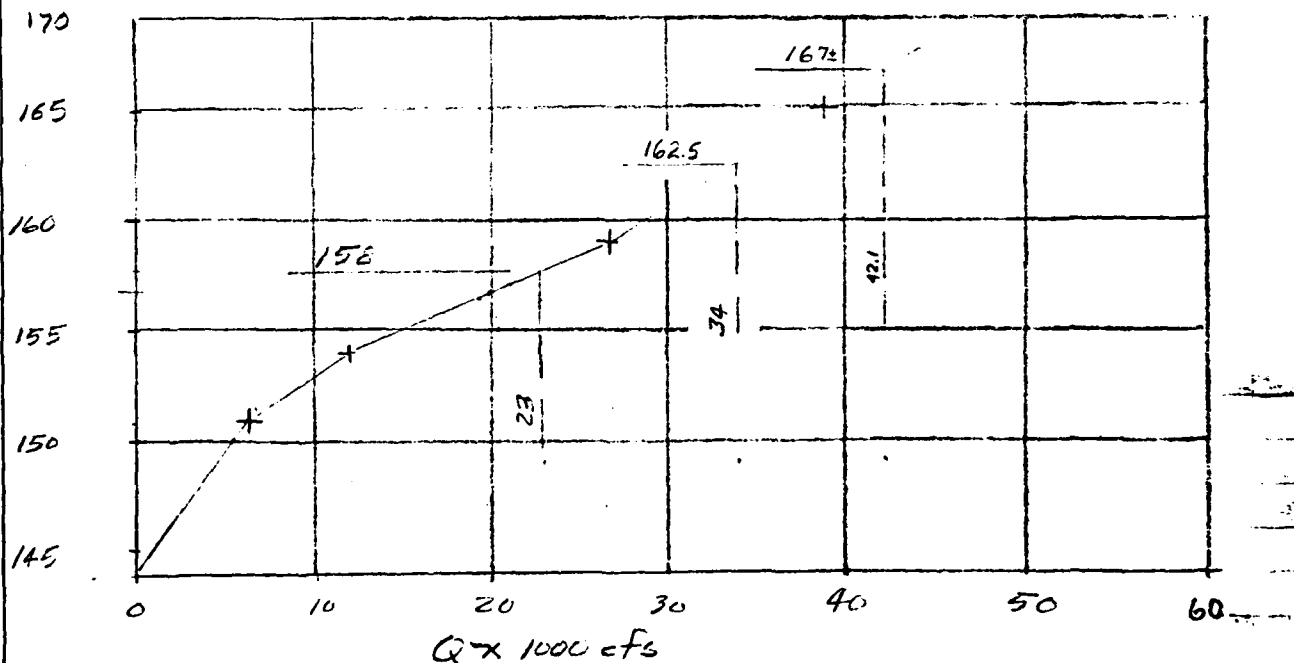
$$K = \frac{1.486}{.05} (.00222)^{1/2} = 1.4$$



$S = 0.00222$   
 $n = 0.03$

D	A	WP	$R^{2/3}$	K	V	Q
7.5'	1950	800	1.81	1.4	2.54	5000 ±
10	3800	1150	2.23	"	3.12	12000 ±
15	7100	1550	2.77	"	3.88	27,500 ±
20	14000	5000	1.99	"	2.77	39,000 ±

elev 164.5 for 1/2 PMF



78,244.1

12-28-78

M.A.

FDD



HAYDEN, HARDING & BUCHANAN, INC.  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

SHEET NO. 8

JOB Dams

SUBJECT Stevens

CLIENT Corps

20  
200

Sta 82+00 ds.

260

190

180

170

R.R. DIKE

160

150 channel

140

130

Slopes to 150', 2300' away

Town of  
Westfield

145

F Btm Slope

Road

160

140

At sta 20+00 ds  $\frac{1}{2}$  PMF level = 155±  
constriction at this point will  
cause flood pool to be over the  
top of R.R. dike, this should  
occur near East Silver Str, West Hampton.  
Influence of Westfield River will also  
cause backwater condition.

Flooding will occur between elev. 145 and 155,  
in the Town of West Hampton, for  $\frac{1}{2}$  PMF

Dam Failure Flood should be confined to river  
banks & adjacent low-flood plains below elev. 140±

N 78,244.1  
E 12/29/78  
M/L  
FDD



HAYDEN, HARDING & BUCHANAN, INC.  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

SHEET NO. 9  
JOB Dam  
SUBJECT Sta. 4.5  
CLIENT Corp.

Elev	Depth (ft)	Area (sq.)	Ave Area	Stor (c.-ft.)	Accum Stor (c.-ft.)
150	-	5.5	5.5	-	-
160	10.	49.6	27.6	276.	276.
164.5	4.5 <sup>4.52</sup>	70.7	60.2	271.	547.
170	5.5 <sup>5.51</sup>	96.4	83.6	460.	1007.
175	5.0	137.0	116.7	584.	1591.
176	1.0	145.11	141.1	141.	1732.
180	4.0	177.5	161.3	645.	2377.

Dam Failure  $Q = 22100$  cfs @ elev 175 to 176  
(see PS 3,4)  $Q = 7424$  wtr @ elev 160 (spillway level)

Sta  $Q_{P2} = 22100 \times \left(1 - \frac{22}{1732}\right) = 21820$

$E_1 = 170 \pm$   $S_{1-2} = 18$  d-f

Ave Stor = 2.0

$Q_{P3} = 22100 \times \left(1 - \frac{26}{1732}\right) = 21,844$  cfs (7338)

7+00

$Q_{P1} = 21800$

$E_1 = 158.25$

$Q_{P2} = 21800 \times \left(1 - \frac{15.6}{1732}\right) = 21,604$  cfs

$E_2 = 158$  Stor<sub>2</sub> = 14

Ave S = 14.8

$Q_{P3} = 21800 \left(1 - \frac{14.8}{1732}\right) = 21,614$  cfs (7275)

20+00

$Q_{P1} = 21614$   $E_1 = 157$

$Q_{P2} = 21614 \left(1 - \frac{14.6}{1732}\right) = 19,789$  cfs

$E_2 = 156$  Stor = 107

Ave = 127

$Q_{P3} = 21614 \left(1 - \frac{127}{1732}\right) = 20,000$  (6792)  
156.5

12/29/78

MA

by FDD



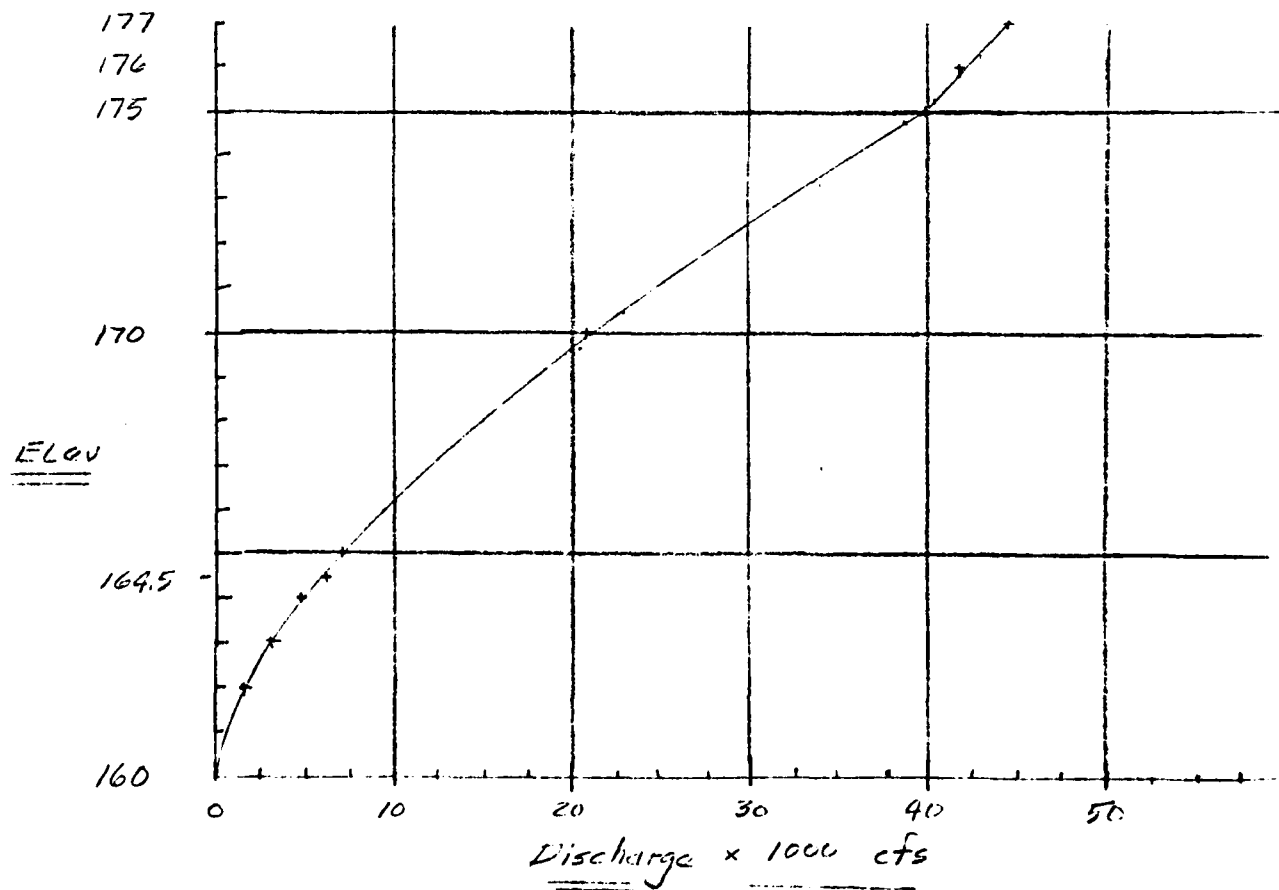
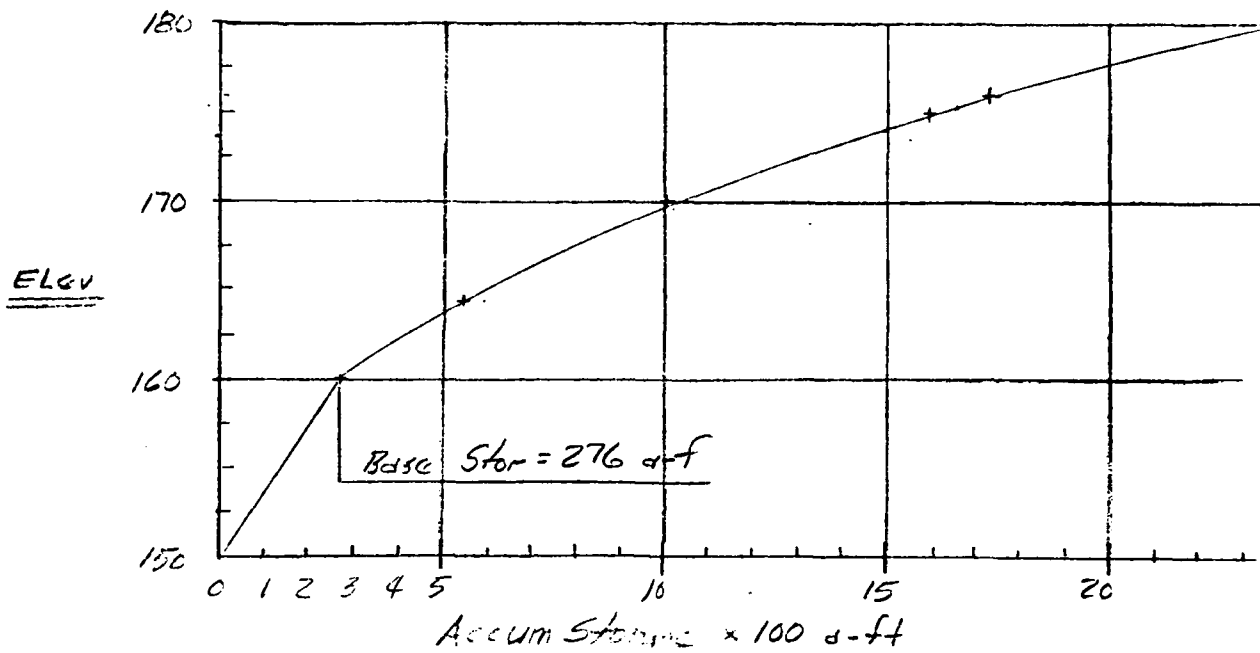
HAYDEN, HARDING & BUCHANAN, INC.  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS

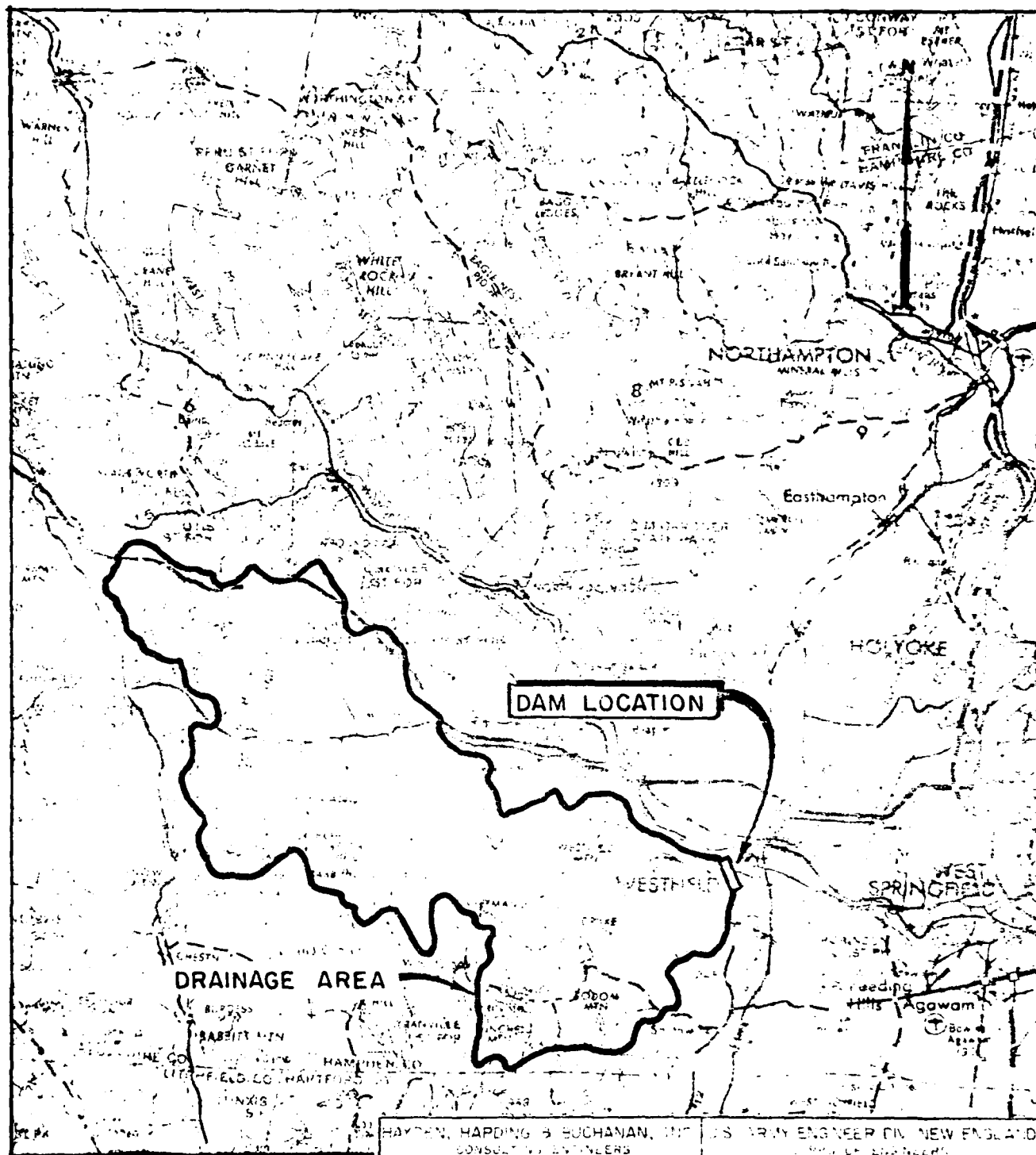
SHEET NO. 14

JOB Dams

SUBJECT Stevens

CLIENT Corps





HAYDEN, HAPDING & SUTCHANIAN, INC. U.S. ARMY ENGINEER DIV. NEW ENGLAND  
CONSULTING ENGINEERS  
BOSTON, MASSACHUSETTS  
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

# STEVENS PAPER CO. DAM (LOWER DAM)

WESTFIELD

MASSACHUSETTS

SCALE 1" = 250,000'

DATE FEBRUARY, 1973



APPENDIX E

INFORMATION AS CONTAINED IN THE  
NATIONAL INVENTORY OF DAMS

**Figure 1**

(a)		(b)	
STATUS	IDENTITY	THREAT	(C) (1)
NA		70	NA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

---

\_\_\_\_\_

---

\_\_\_\_\_

10

---

(Not very different from PMF over 50 ft s.m. - 40,000 cfs).  
USGS Circular 377 & WSP 1420 Aug 19, 1955  
flood 21,700 cfs at dam - calculated. Drainage  
area 77.7 sq.m., "no flow" from Cobble Mtn.

END

DATE  
FILMED

9-84

DTIC